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NATIONAL ENGINEERING AND SCIENCE PERSONNEL ACT OF 1983

FEBRUARY 25, 1983.—Ordered to be printed

Mr. FUQUA, from the Committee on Science and Technology, submitted the following

REPORT

together with

MINORITY AND ADDITIONAL VIEWS

[To accompany H.R. 1310 which on February 8, 1983, was referred jointly to the Committee on Education and Labor and the Committee on Science and Technology]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 1310) to provide assistance to improve elementary, secondary, and postsecondary education in mathematics and science; to provide a national policy for engineering, technical, and scientific personnel; to provide for cost-sharing by the private sector in training such personnel; and for other purposes, having considered the same, report favorably thereon with amendments and recommend that the bill as amended do pass.

The amendments are as follows:

Page 2, line 7, insert "and Jobs" after "Education".

Page 7, strike out line 12 and all that follows through line 6 on page 17 and insert in lieu thereof the following:

"PART B—POSTSECONDARY ASSISTANCE

"FINDINGS

"SEC. 621. (a) The Congress finds that it is necessary (1) to improve the educational foundation of American citizens in order to improve the Nation's economic productivity, (2) to encourage students in postsecondary education to

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pursue teaching careers in mathematics, science, and critical foreign languages, (3) to encourage members of groups now underrepresented in mathematics, science, and critical foreign language teaching, including women, racial and ethnic minorities, and the handicapped, to pursue such careers, and (4) to improve the quality of instruction in colleges of teacher education.

"(b) The Congress declares that it is therefore necessary (1) to increase the number and quality of postsecondary students entering careers in teaching, (2) to increase the number and quality of students entering teaching from groups now underrepresented in mathematics, science, and critical foreign languages, including women, racial and ethnic minorities, and the handicapped, (3) to improve the quality of instruction for future teachers of mathematics, science, and critical foreign languages, (4) to utilize the National Science Foundation when developing and monitoring programs designed to improve the quality of instruction for future teachers of mathematics and science, (5) to provide enriched opportunities for currently employed teachers, and (6) to evaluate (A) current teaching techniques, including technological improvements in classroom equipment and instructional methods and the use of community resources such as science museums, regional centers, public television, and community colleges, and (B) methods of improving instruction.

"NATIONAL TEACHING INCENTIVE SCHOLARSHIPS

"SEC. 622. (a)(1) Sums available for the purpose of this section shall be used to award national teaching incentive scholarships in accordance with this section to not more than 5,000 individuals for fiscal year 1984, and to not more than 10,000 individuals for fiscal year 1985. Such scholarships may not exceed an amount equal to the tuition and fee expenses of any recipient for two academic years (of undergraduate or graduate education) and may be paid only upon proof of satisfactory achievement in the preceding academic year.

"(2) The Secretary of Education may reserve up to 30 percent of the sums available for national teaching incentive scholarships to make awards to individuals who are currently teachers for one year of study at an institution of higher education. Such arwards shall not exceed $5,000 to cover the cost of attendance at such institution and related expenses.

"(3) The Secretary of Education may reserve up to 10 percent of the sums available for national teaching incentive scholarships for individuals pursuing a course of instruction in a critical foreign language.

"(b) Each chief State school officer or appropriate State officer responsible for postsecondary education may provide to the Secretary of Education the names and qualifications of a number of individuals who are qualified to re-

ceive national teaching incentive scholarships which does not exceed the product of the number of Members of Congress from that State, multiplied by twenty. The chief school officers of the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, the Northern Mariana Islands, and the Trust Territory of the Pacific Islands may each provide to the Secretary the name and qualifications of not more than fifty such individuals. Such nominations shall be supported by suitable academic credentials and recommendations, and shall include a personal statement by the individual expressing a commitment to pursue a career in teaching.

"(c)(1) Recipients of national teaching incentive scholarships shall be selected by a committee composed of the Librarian of Congress (acting as chairman), the Secretary of Education, the Director of the Office of Science and Technology Policy, the Director of the National Science Foundation, the Administrator of the National Aeronautics and Space Administration, four individuals appointed by the Speaker of the House of Representatives, and four individuals appointed by the majority leader of the Senate. The individuals appointed by the Speaker and the Majority Leader shall be individuals (A) who are prominent in public or private elementary, secondary, or postsecondary education, such as teachers, professors, administrators, or officials, (B) who are practicing scientists or mathematicians, (C) who are in private business enterprises and who have a thorough understanding of the requirements for educated employees of business, or (D) who are members of the public, including parents of students and students.

"(2) Selections of recipients of national teaching incentive scholarships shall be made in accordance with regulations prescribed by the Secretary of Education after consultation with the Librarian of Congress, the Director of the National Science Foundation, and the Director of the Office of Science and Technology Policy. Individuals shall be selected on the basis of merit and shall be pursuing a course of instruction in science, mathematics, or a critical foreign language. The committee shall ensure that the individuals so selected include individuals who are unrepresented or underrepresented in the respective disciplines, including women, racial and ethnic minorities, and the handicapped. The committee shall also assure appropriate geographic distribution of national teaching incentive scholarships.

"(d) To be eligible for selection as a national teaching incentive scholarship, an individual shall have completed the equivalent of at least two years toward a baccalaureate degree and shall have formally expressed the intention to teach elementary or secondary school mathematics, science, or critical foreign language for at least two years for each year for which assistance is received under this section.

"(e) Each recipient of a national teaching incentive scholarship shall be obligated to each for two years for each year of assistance received, or to repay the total amount of the scholarship, plus interest at a rate prescribed by the Secretary of Education.

"(f) Notwithstanding the provisions of section 428(a)(2)(B) through (F) and section 482(a)(1) and (2) of the Higher Education Act of 1965, funds awarded pursuant to subsection (a) shall not be considered in determining eligibility for student assistance under title IV of such Act, but the sum of student assistance under such title and a national scholarship shall not exceed the cost of attendance (as such term is defined in section 482(d) of such Act). However, this subsection shall not be construed to require the payment of a scholarship of less than $1,000.

"AUTHORIZATION OF APPROPRIATIONS

"SEC. 623. Notwithstanding any other provision of this part, there are authorized to be appropriated to carry out this part $20,000,000 for fiscal year 1984 and such sums as may be necessary for fiscal year 1985.

"PART C—TEACHER INITIATIVE GRANTS

"AUTHORIZATION OF APPROPRIATIONS TO THE DEPARTMENT OF EDUCATION

"SEC. 641. There are authorized to be appropriated to the Department of Education to carry out this part $5,000,000 for fiscal year 1985.

"ALLOCATION OF APPROPRIATIONS

"SEC. 642. The amount appropriated pursuant to section 651 for any fiscal year shall be allocated among the States in the same manner as is required by section 603(a) of this title.

"USE OF FUNDS

"SEC. 643. (a) Funds made available to any State pursuant to this part shall be used to make grants to teachers, who have complete inservice or other training under parts A or B of this title, for teacher intitiated projects to improve mathematics, science, and technology education. Such uses may include—

"(1) purchase of equipment for a specific classroom project or demonstration;

"(2) purchase of specialized reference materials;

"(3) transportation and other costs of participation for class visits to science museums, computer centers, laboratories, or institutions involved in research and development; and

"(4) underwriting the cost of bringing special equipment or lecturers to the classroom or school for student and faculty enrichment.

"(b) From the amount available to any State, the State educational agency may reserve not more than one percent of such amount for the conduct of State administration and activities to assist teachers in formulating programs eligible for grants under this part.".

"(b) Section 103 of the National Defense Education Act of 1958 is amended to read as follows:

"DEFINITIONS

"SEC. 103. Except as otherwise provided therein, the following terms are defined for purposes of this Act:

"(1) The term 'State' means any of the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Northern Mariana Islands, or the Trust Territory of the Pacific Islands.

"(2) The term 'institution of higher education' has the same meaning given such term in section 1201(a) of the Higher Education Act of 1965.

"(3) The term 'Secretary' means the Secretary of Education.

"(4) The term 'State educational agency' has the same meaning given such term in section 198 of the Elementary and Secondary Education Act of 1965.

"(5) The term 'school-age population' means that part of the population which is between the ages of five and seventeen, both inclusive, and such school-age population for the several States shall be determined by the Secretary on the basis of the population between such ages for the most recent year for which satisfactory data are available from the Department of Commerce.

"(6) The term 'elementary school' has the same meaning given such term in section 198 of the elementary and Secondary Education Act of 1965.

"(7) The term 'secondary school' has the same meaning given such term in section 198 of the Elementary and Secondary Education Act of 1965.

"(8) The term 'local educational agency' has the same meaning given such term in section 198 of the Elementary and Secondary Education Act of 1965.".

SUMMER INSTITUTES AND WORKSHOPS

SEC. 103. (a) From the funds available for this section, the Secretary of Education and the Director of the National Science Foundation shall make grants to institutions of higher education (as that term is defined in section 1201(a) of the Higher Education Act of 1965) to support summer institutes and other workshops for supervisors and teachers in elementary and secondary schools to improve the knowledge and skills of such teachers in the areas of

mathematics, science, and critical foreign languages, and to improve their instructional skills. Such institutes may, to the extent possible, involve the cooperation of advanced technology firms and other private industries which are able to supply assistance in the teaching of mathematics and science. Upon request of the State educational agency, the Secretary or the Director of the National Science Foundation may make grants to other public teacher training agencies prior to January 1, 1983.

(b) The Secretary of Education and the Director of the National Science Foundation shall each prepare a program implementation plan for the programs under this section. Such plans shall provide for appropriate coordination of such programs by the Department of Education and the National Science Foundation. No funds may be obligated for expenditure under or expended for any such program unless—

(1) a period of 30 calendar days (excluding and day on which either House of Congress is not in session because of an adjournment of more than three days to a day certain) has passed after the Secretary of Education or the Director of the National Science Foundation respectively, has transmitted such plan to the appropriate committees of the House Representatives and the Senate; or

(2) each such committee before the expiration of such period has transmitted to the Secretary or the Director a written notice to the effect that such committee has no objection to the plan.

POSTSECONDARY MATHEMATICS, SCIENCE, AND CRITICAL FOREIGN LANGUAGE IMPROVEMENT

SEC. 104. (a) Funds available for this section shall be made available by the Director of the National Science Foundation for competitive grants to institutions of higher education (as that term is defined in section 1201(a) of the Higher Education Act of 1965) for undergraduate mathematics, science, and critical foreign language curriculum improvement and faculty development, in consultation with the school or department of education at that institution. Such programs shall be directed to improving instruction in mathematics, science, and critical foreign languages for degree and nondegree students who have or who are pursuing teaching certificates.

(b) Twenty-five percent of the funds available pursuant to subsection (a) for any fiscal year shall be made available by the Director of the National Science Foundation for programs described in such subsection to institutions of higher education which are eligible for assistance under title III of the Higher Education Act of 1965.

INVESTIGATIONS OF EFFECTIVE EDUCATIONAL METHODS AND PROGRAMS

SEC. 105. (a) The Director of the National Science Foundation, in consultation with the Director of the National Institute of Education, shall conduct investigations of effective methods of instruction, and effective educational programs, in mathematics, science, and critical foreign languages (including technical literacy and methods to secure full participation of women and racial and ethnic minorities). Such studies may include—

(1) teaching and learning research in mathematics, science, and critical foreign languages and in the instructional uses of information technologies;

(2) application of teaching and learning research to the local and private sector development of instructional materials, and to the improvement of teacher training programs;

(3) research on the effective use of community resources such as science museums, regional centers, public television, community colleges, and local industries in the teaching of mathematics and science;

(4) investigation of the affect of secondary school operations on student learning in mathematics, science, and critical foreign languages;

(5) analysis of local and institutional policies enhancing or inhibiting the recruitment, retention, and improvement of mathematics, science, and critical foreign languages faculties; and

(6) analysis of effective materials and methods of instruction used in other nations, and their potential application in the United States.

(b) Studies conducted pursuant to subsection (a) shall be reported to the Office of Science and Technology Policy and shall be made available to the public. The Office of Science and Technology Policy shall include the results of such studies in its report to the President and the United States Congress.

MINORITY INSTITUTIONS SCIENCE IMPROVEMENT

SEC. 106. Section 406A of the General Education Provisions Act (as added by the Education Amendments of 1980; 94 Stat. 1497) is amended to read as follows:

"AUTHORIZATION OF APPROPRIATIONS FOR SCIENCE IMPROVEMENT PROGRAM

"SEC. 406A. There are authorized to be appropriated $5,000,000 for each of the fiscal years 1984 and 1985 for the purpose of carrying out the Minority Institutions Science Improvement program transferred to the Secretary of Education from the National Science Foundation by section 304 of the Department of Education Organization Act.".

AUTHORIZATION OF APPROPRIATIONS

SEC. 107. (a) There is hereby authorized to be appropriated to the Department of Education $20,000,000 for each of the fiscal years 1984 and 1985 to carry the responsibilities of the Department under section 103.

(b) There is hereby authorized to be appropriated to the National Science Foundation $30,000,000 for each of the fiscal years 1984, 1985, 1986, 1987 and 1988 of which not less than—

(1) one-half shall be available to carry out the Foundation's responsibilities under section 103,

(2) one-third shall be available to carry out section 104, and

(3) one-sixth shall be available to carry out section 105.

TITLE II—NATIONAL ENGINEERING AND SCIENCE PERSONNEL

SHORT TITLE

SEC. 201. This title may be cited as the "National Engineering and Science Personnel Act of 1983".

FINDINGS AND PURPOSES

SEC. 202. (a) The Congress finds that—

(1) technical, engineering, and scientific personnel are an integral part of the Nation's economic, strategic, and national security needs, and are necessary for any potential growth and development to provide for the Nation's international competitiveness;

(2) there currently exists a pressing need for trained technicians and engineers for the Nation's industry and defense, with particular concern for such high technology fields as electronics, information technology, and energy, and a need for technicians and engineers who are able to understand critical foreign languages and read foreign technical journals;

(3) improving the understanding of science and mathematics by all citizens is a key means by which to increase the number of those desiring to pursue technical, engineering, and scientific careers, and it is a key means by which citizens may gain the information they must have in order to support education responsibly;

(4) the United States needs a comprehensive policy and commitment regarding the Federal role in technical, engineering, and scientific personnel;

(5) the availability and quality of graduate engineering researchers and faculty is currently declining;

(6) the Nation is failing to attract sufficient numbers of minorities and women in the technical, engineering, and scientific fields to take proper advantage of these human resources;

(7) the Nation now faces potential shortages in scientific as well as engineering and technical fields; and

(8) the creation of a pool of highly qualified new engineering, technical, and scientific personnel will lead to the creation of a significant number of new jobs in these fields which will strengthen the Nation's economy.

(b) It is the purpose of this title to provide a national policy for technical, engineering, and scientific personnel to provide a means for cost-sharing by the private sector in training such personnel, and to encourage the creation of new engineering, technical, and scientific jobs.

POLICY

SEC. 203. (a) The Congress declares that it shall be the continuing policy of the United States to maintain an adequate supply of technical, engineering, and scientific personnel to insure the technological strength and security of the Nation. The Congress further declares that the President shall take all necessary actions to coordinate the various departments and agencies of the Federal Government in carrying out this policy, including (among other measures) actions to—

(1) identify the technical, engineering, and scientific human resource needs necessary for the well-being of the Nation;

(2) establish and maintain the necessary means for continually assessing the Nation's short- and long-term technical, engineering, and scientific human resource needs, including the need to maintain knowledge of foreign technical and scientific development, and to provide the policies and programs necessary to meet those needs;

(3) promote and provide leadership to increase understanding of science and mathematics by all citizens;

(4) promote, encourage, and provide leadership and coordination to the efforts of the public and private sector, including the appropriate professional societies, to establish such policies and programs to carry out the purposes of this Act;

(5) assist institutions of higher education and research in assuring the adequacy and merit of instruction, research, and numbers of qualified graduates in science and engineering; and

(6) encourage the support of the private sector in meeting the Nation's needs for research and development and for science, engineering, and technical personnel.

(b) The Congress further declares that the primary responsibility for developing policies for Federal support of research and development and of science, engineering, and technical personnel lies with the Office of Science and Technology Policy in the Executive Office of the President.

(c) Each Federal department and agency authorized to establish, or to cooperate with State and local governments or private sector organizations in establishing, programs

and activities for the training and education of technical and engineering personnel as may be necessary for the directed missions of the department or agency involved, shall coordinate such programs and activities with the Office of Science and Technology Policy in the Executive Office of the President.

ESTABLISHMENT OF ENGINEERING AND SCIENCE PERSONNEL FUND

SEC. 204. (a) There is hereby established within the National Science Foundation a special Engineering and Science Personnel Fund (hereinafter referred to as the "Fund") to promote and develop the quality of the United States technical, engineering, and scientific personnel resources. The Fund shall be administered by the National Science Foundation. In administering the Fund, the National Science Foundation is authorized to expend moneys for grants for such research (related to education in mathematics, science, and engineering), fellowships, capital equipment, salaries, instrumentation, and other activities as are considered necessary in carrying out the purposes of this Act.

(b) In directing policy for the Fund, the National Science Foundation shall take into account the current status and predictions of supply and demand for trained personnel in each discipline or specialty.

(c) Moneys for grants from the Fund shall be expended through a system of matching grants with such other private or public sector funds as may be made available (including in-kind service or other resources), with the moneys provided from the Fund for any individual grant not to exceed one-half of the total cost of the program supported by such grant.

(d) The Fund is established only for a period of five fiscal years after the enactment of this Act; and the continuance of the Fund beyond such five-year period shall require the specific authorization of the Congress.

(e) The National Science Foundation shall report to the Congress regularly, but no less than once every two years, concerning the expenditure of moneys under the Fund.

PRIORITIES FOR USE OF FUND

SEC. 205. (a) The Engineering and Science Personnel Fund established in section 204 shall have as the principal focus of its activities the following priority areas:

(1) recruitment and retention of new engineering faculty;

(2) two-year and community college faculty and instructor development in high technology fields, such programs to include faculty development, instructional development, model instructional program costs, and instrumentation;

(3) development of programs of instructional instrumentation and systems for postseconday technical, engineer-

ing, and scientific education, with special emphasis on computer accessibility;

(4) pre-college science and mathematics education and training, including programs to promote cooperation and exchange of resources and personnel with industry and other elements of the private sector;

(5) public understanding of science and mathematics;

(6) developing and disseminating instructional materials and resources for improvement of education in engineering, mathematics, and the sciences; and

(7) four-year college faculty and instructor development in high technology fields, such programs to include instructional development and instrumentation.

(b) Of the amounts available for section 204 of this Act, funds shall be made available for the priorities established in subsection (a) as follows:

(1) not less than 20 percent shall be expended for subsection (a)(2);

(2) not less than 15 percent shall be expended for subsection (a)(3); and

(3) not less than 15 percent shall be expended for subsection (a)(4).

COORDINATION OF ACTIVITIES; REPORTS

SEC. 206. (a) Pursuant to title IV of the National Science and Technology Policy, Organization, and Priorities Act of 1976, the Office of Science and Technology Policy shall have responsibility for coordinating the activities of the Department of Education and the National Science Foundation under this Act, except for activities under part A of title VI of the National Defense Education Act of 1958 (as added by section 102(a) of this Act).

(b) Within one year from the date of enactment of this Act, the National Science Foundation and the Department of Education shall provide to Congress a joint report on their activities under this Act. Such report shall be revised periodically, but no less than every two years for the duration of the programs and activities authorized in this Act.

AUTHORIZATION OF APPROPRIATIONS

SEC. 207. There is hereby authorized to be appropriated to the Engineering and Science Personnel Fund to carry out the purposes of this title the sum of $100,000,000 for each of the fiscal years 1984, 1985, 1986, 1987, and 1988.

Amend the title of the bill so to read as follows:

A bill to provide assistance to improve elementary, secondary, and postsecondary education in mathematics and science; to provide a national policy for engineering, technical, and scientific personnel; to provide cost sharing by the private sector in training such personnel; to encourage creation of new engineering, technical, and scientific jobs; and for other purposes.

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I. Purpose of the Bill

During the past several years the Committee on Science and Technology has been made increasingly aware of problems in the nation's ability to provide trained and technically skilled personnel necessary to our continued national economic strength and vitality. Specific areas of concern include: A decrease in engineering faculty with a concurrent increase in engineering enrollment; a decline in the quantity and quality of new graduate engineers and researchers; a decline in the number of science and mathematics teachers at the precollege level; a long-term decline in precollege scientific literacy and an increased need for skilled technicians in various high technology fields. These problems have been identified in various hearings before the Committee, in national studies and conferences, and in individual communications to the Committee. The lack of (1) a comprehensive national policy regarding technical, en-

gineering and science manpower, or (2) a means for formulating such a policy and assessing related technical personnel needs, or (3) specific programs designed to implement personnel policies and to improve the scientific and technical literacy of the general public.

The principal purposes of H.R. 1310 as reported by the Committee on Science and Technology are to (1) establish a broad national policy for engineering, scientific and technical personnel (2) assist in the revitalization of mathematics, science and critical foreign languages education in our nation's primary and secondary school systems and (3) assist post-secondary schools to cope with problems of shortages and obsolesence of faculty and equipment, (4) to assist in the development of model programs to produce technical personnel for high technology industries, and (5) to help improve the understanding of mathematics, science, and technology in the public at large.

II. Brief Summary of the Bill, as Amended

The bill before the Committee contained two titles. Title I, Sec. 102 of the bill as introduced amended the National Defense Education Act of 1958, by adding a new Title VI which is broken into Parts A, B, and C. This Title was the text of H.R. 30 as referred to the Committee on Education and Labor. Title II of the bill as introduced is the text of H.R. 582 which was referred to the Committee on Science and Technology.

The Committee took action on those matters properly under its jurisdiction, and worked with Members and staff of the Committee on Education and Labor so that the actions of the Committee, as reflected in the reported amendment to the bill incorporate the changes in those parts acted on which were made by the Education and Labor Committee in its reported amendment to the bill. To be as clear about the delineation of jurisdiction as possible between the two committees, those matters contained in Part A of Title VI, specifically Sec. 102, were not acted on by the Committee. However, because of the overlap for those matters contained in Part B, and Part C of the introduced bill, the Committee worked with the Education and Labor Committee to incorporate the reported amendment, as an amendment outside of the National Defense Education Act of 1958.

The remaining sections of Title I (Sections 103 through 107) provide for various programs within the Department of Education and the National Science Foundation. Those provisions in section 102 deal with science and mathematics education improvement programs at primarily the elementary and secondary education levels. Post secondary National Teacher Incentive Scholarships for increasing the numbers of precollege science, mathematics and critical foreign language teachers is also included in this section. The remaining sections provide for: (1) summer institutes and workshop programs within NSF and the Department; (2) post-secondary mathematics, science and critical foreign language improvement programs under NSF, (3) educational research programs under NSF, and (4) reauthorization of the Minority Institutions Science Improvement Program.

Title II of the amendment establishes policies and programs for the training of technical, engineering and science personnel, through the National Science Foundation. There is established a special, cost-engineering and Science Personnel Fund with identified priority areas stipulated. Coordination is further stipulated through the Office of Science and Technology Policy of the Executive Office of the President.

Title I, Part B (of Title VI in Section 102) contains $20 million for the postsecondary portions of Sec. 102, and $55 million for the activities within the sections 103, 104, and 105. Title II provides $100 million for the Engineering and Science Personnel Fund. Department of Education monies are authorized for fiscal year 1984 and 1985. The NSF activities are authorized for the fiscal years 1984 through 1988.

III. Background and Need for the Legislation

In hearings before the Committee on Science and Technology, testimony has focused on a number of concerns regarding technical, engineering and scientific personnel needs. Much of this has centered on issues in the general areas of precollege education, post-secondary education and public literacy and technician training. The following provides some disussion of the facts and concerns in each of these areas. (The statistics and data cited, unless otherwise noted, come from testimony before the committee in the hearings listed in Section VII of this report and those noted in H. Rpt. 97–933 of the previous Congress.)

A. PRECOLLEGE EDUCATION

In dealing with the engineering and scientific personnel problem it is necessary to address the underlying causes. One such cause is the present weakness of primary and secondary school science and mathematics education. The structure of science and mathematics education can be seen as a pyramid with the primary and secondary schools at the base and colleges and universities producing engineers, scientists, and other trained specialists at the top. If the base is weak and underproductive, the entire system will be unreliable. Further, the failure to develop a strong base in mathematics and science at the precollege levels decreases the resource pool of people from which the new engineers and scientists can be drawn. This is of particular concern given current demographic trends. In short, our nation's future in engineering and scientific personnel is determined during the precollege years.

Today, only thirteen percent of all high school graduates are prepared for the engineering curriculum in college, compared with twenty-eight percent in 1972. One of the many reasons for this is that high school requirements for math and science were lowered during the 1970's, as were the science and math requirements for college admission. Further, every standardized test used to measure science and math capabilities showed a steadily declining level of achievement from 1971 through 1981. Fewer secondary school students are taking fewer courses in math and science than in years past. At a recent National Academy of Sciences convocation, Professor Paul Hurd of Stanford University pointed out that only

thirty-four percent of recent high school graduates have taken three years of math. Of these, only eight percent have taken calculus, and less than twenty percent of high school graduates have taken three years of science. Of the forty percent of high school graduates who took the college preparatory program, fifty-five percent have taken three years of math and forty-one percent have taken three years of science. Other studies indicate that forty-eight percent of high school students were enrolled in at least one science class in the academic year of 1976–1977. In contrast, fifty-nine percent were enrolled in at least one science course in the academic year 1960–1961.

Comparatively, U.S. high school students spend only a fraction of the amount of time in math and science spent by their counterparts in other countries such as Japan and West Germany. For instance, in the United States, only one-sixth of all high school students have taken junior or senior math courses and two-thirds of U.S. high schools require only one year of math and science for graduation. These facts are even more dramatic when considered in light of the great strides in technology made by Japan and the fact that Japan has mounted a serious threat to the United States as the world's preeminent technological power.

The crisis in precollege math and science education is also seen in the quality and quantity of precollege teachers. According to the National Education Association, the supply of math teachers equaled only seventy-eight percent of the current demand, with twenty-two percent of the available teaching posts left vacant. In a survey taken by the National Governors Association, forty-three out of forty-five states reported a shortage or critical shortage of math teachers, forty-two states reported a shortage of physics teachers, and thirty-eight states reported a shortage of chemistry teachers. This problem is growing worse year by year. The National Science Board reports that experienced science and math teachers left their jobs at the rate of four percent in 1980 and 1981, with another twenty-five percent expressing the intention to leave in the near future. If this trend continues, the nation will suffer a net loss of thirty-five percent of its science and math teachers by 1992. This trend is also reflected in the fact that the average age of science teachers responding to a recent survey was forty-one, an indication that an insufficient number of new and young science teachers are entering the profession.

The precollege math and science education picture is further clouded by an apparent decline in the quality of teachers. Among newly employed science and math teachers, fifty percent were judged by their principals as being unqualified to teach their subject. In addition, since 1972, there has been a seventy-seven percent decline in the number of qualified secondary school math teachers nationwide who were prepared in college teacher programs. Twenty-six percent of all math teaching positions are filled by noncertified teachers and close to twenty percent of all high school science teachers were non-science majors in college. Of all the present science and math teachers, seventy-nine percent have not completed a ten hour workshop or course in their subject area in over ten years, sixty-nine percent have never attended a computer course

and forty percent have not attended a course or workshop since they began teaching.

The reasons for the decline in the number of qualified math and science teachers are complex. Of those cited in testimony, many are related to the level of salaries and lack of distinction between those teachers who excel and those who do not. Looking at salary, the average salary of a new, graduating teacher is between $9,000 and $10,000 annually, whereas $18,000 to $30,000 is commanded by those entering scientific or technically oriented professions. Further, teachers with good qualifications in math or science are being enticed to accept jobs in industry where the salary is certainly better. Also, extra burdens such as the need to seek summer employment, participate in mandatory extracurricular activities or contend with unpredictable school administrators, parents, students and other teachers, are eliminated in the private sector. Finally, many have noted that the public attitude toward teachers and teaching has declined to such an extent that most would counsel young potential teachers to seek other careers.

Thus, the nation is confronted with a declining trend in both the overall quality and the availability of precollege science and math teachers. Such a trend will have a profound effect on the nation's future supply of qualified scientists, technicians and engineers needed to operate our economy in years to come.

B. POSTSECONDARY EDUCATION

College and university schools of engineering suffer from a critical shortage of qualified faculty. Eighteen hundred full time faculty positions, representing nine percent of the total engineering faculty positions, are vacant and most have been left vacant for at least one year. Such reductions in numbers of faculty have led many engineering schools to limit their enrollments, thus exacerbating the problem of providing sufficient numbers of appropriately skilled engineers. A similar situation exists regarding two year institutions of higher education. In the 1979–1980 academic year alone, four hundred engineering faculty (three percent of all faculty positions) left their positions for new jobs in industry. Moreover, the difference between starting salaries in industry and the average faculty salary has swelled to thirty-three percent over the last four years.

The antiquated condition of instructional and research equipment in university laboratories is another reason many faculty members migrate from the teaching profession to industry. Much of the equipment is of 1950's vintage and cannot compare to the state-of-the-art equipment now used in private industry. Visiting scientists from technologically advanced countries have expressed their surprise with the deteriorated condition of scientific equipment in university laboratories. Dean Daniel C. Drucker of the University of Illinois School of Engineering, along with many of his counterparts at other academic institutions, described the proportions of the problem when he estimated that an investment of one billion dollars would be necessary to update university laboratories to a level of quality equal to that of private industry. Testimony by the National Science Foundation placed the estimate as high as $4

billion. As the nation progresses in new technological fields such as design automation, process control, or microfabrication, the research and instructional equipment will be highly expensive and prone to quick obsolescence. Special attention must be given to problems adversely affecting undergraduate and graduate engineering and science faculty.

Since 1972, there has been a large decline in the number of Ph.D.'s in engineering awarded yearly to U.S. nationals while the number of Ph.D.'s awarded to foreign students has increased. In 1972 a total of 3,587 new Ph.D's in engineering were awarded by U.S. institutions, of which 708 were awarded to foreign nationals. In 1980 the corresponding figures were 2,751 and 982. Thus, a serious decline in the number of advanced engineering degrees earned by U.S. citizens depletes our pool of engineering faculty. At the same time, our potential economic competitors are sending more students to the United States for advanced scientific and engineering degrees.

During the course of the hearings on this and related legislation, witnesses stressed the point that national economic vitality and growth are directly related to the training of graduate students, especially in technical areas. Thus, the drop in the number of U.S. students obtaining advanced engineering degrees will threaten the future availability of a sufficient number of undergraduate and graduate faculty. If the current trends in post-secondary science and engineering education continue, the nation will be caught in a cycle that will ultimately result in a steady decline in the number of technically competent people for an economy that is growing more and more technically oriented.

C. PUBLIC LITERACY AND TECHNICIAN TRAINING

The changing nature of America's work force is another major factor bearing upon the transition to a more technologically oriented economy. Over the next twenty-five years, the changes in our human resources will have a decisive effect on our economic future. When combined with the current trends at all levels of education, these demographic changes must be dealt with if we are to have an adequate supply of technically skilled workers.

The most pronounced change in the labor force can be seen in the future reduction in the number of blue collar manufacturing jobs. Currently, twenty million workers, twenty percent of the labor force, are employed in blue collar manufacturing. Most projections for the year 2005 indicate that only seven to twelve million workers, or five to ten percent of the work force, will be engaged in blue collar manufacturing jobs. Some of the developments that bring about this reduction in the manual manufacturing work force can be seen in demographic changes.

Almost everyone who will function in the American economy in the next twenty years has already been born. This pool of workers for the turn of the century is different in ways that will change the direction of the economy.

First, there has been a thirty percent reduction in the birthrate. The "baby bust", which started in 1960, will cause a thirty percent reduction in the number of people reaching working age over the

next two decades. Thus, the number of people newly available for traditional blue collar manufacturing jobs will be one-third smaller. The number of workers aged 16–25 will shrink by sixteen percent in this decade alone.

Second, during the next twenty years the number of people with an education level beyond high school will double. In 1940 high school graduates comprised twenty-five percent of the work force, whereas sixty-eight percent of the work force in 1979 has graduated from high school. Today, better than one-half of the men and women entering the work force have stayed in school beyond high school. Their expectations in life as well as capabilities are higher than assembly workers of the past who had a lower level of education. Many experts feel that manufacturing jobs will not appeal to a more highly educated work force. In order to respond to this trend, the U.S. economy will have to create fifty percent more jobs for educated people than ever before. Employment opportunities will have to come from "knowledge jobs."

Third, the work force is becoming more heterogeneous. Women will continue to constitute a larger percentage of the labor pool. In 1960 women represented thirty-seven percent, whereas in 1982, fifty percent of the total number of workers are women. In the next decade, two-thirds of all new entrants into the economy will be women. In education, more women than men are enrolled in college and a growing proportion of women is working toward advanced degrees.

These and other demographic changes as well as technological changes make it necessary for industry, academia and government to respond in such a way as to provide tomorrow's economy with the necessary technical training. The committee believes that a major focus on new technician training or retraining of the present workforce is critical as the technologies and economy shift. Certainly some of these dislocations in the workforce can already be seen as whole industries such as the steel, automotive and industrial processing industries are cut back or eliminated. Such training or retraining will need to emphasize computer and information technology, electronics, communications, robotics and other advanced technology areas.

IV. Explanation of the Bill, as Amended

The Committee on Science and Technology restricted its consideration of H.R. 1310 to the portions of Title I, creating Title VI, Part B and C of the National Defense Education Act, and Title II.

A. OVERVIEW

The Department of Education would administer the programs in Section 102 of Title I acted on by the Education and Labor Committee. The Department of Education has much experience in overseeing large-scale grant programs, has long-standing relationships with educational agencies and institutions, and is in a position to coordinate the new Title VI, Part A of NDEA programs with existing education programs. Title VI, Part B of NDEA provides scholarships to prospective teachers in the areas of science, mathematics

and critical foreign languages; Part C provides for special teacher initiative grants.

The National Science Foundation and the Department of Education would share the administration of Section 103 of Title I, providing for summer institutes programs to improve the skills of precollege teaching and teaching supervisors. Sections 104, 105 and 106 respectively, provide (1) post-secondary mathematics, science and foreign language improvement, (2) research in the improvement of mathematics, science and foreign language education, and (3) the reauthorization of the Minority Institutions Science Improvement Program (MISIP). Both Federal agencies have extensive complementary experience in working with universities on education matters and it is certainly appropriate to use the particular strengths of each in most effectively carrying out these programs.

Title II of H.R. 1310 would be a new Act. This title is concerned with the development of an adequate supply of technical, engineering, and scientific personnel for the nation. Responsibility for carrying out the provisions of Title II would be assigned to the Office of Science and Technology Policy and the National Science Foundation. The National Science Foundation would administer a special matching Engineering and Science Personnel Fund in carrying out its responsibilities under the Act.

B. OTHER PROGRAMS IN TITLE I

This part of Title I is aimed at preparing new mathematics, science and critical foreign language teachers and improving and updating the skills of current teachers. This portion of the title also seeks to strengthen postsecondary mathematics, science and critical foreign language instruction for students entering teaching and to stimulate educational research in those disciplines and to encourage members of groups now underrepresented in mathematics, science, and critical foreign language teaching to pursue such careers. In addition, this portion of the bill also has as a goal the improvement of mathematics, science and critical foreign languages primarily in colleges of teacher education. Finally, investigations of effective educational methods and programs are provided for in this title.

1. National teaching incentive scholarships (section 102, part B of title VI of NDEA)

H.R. 1310, as amended, establishes the National Teaching Incentive Scholarships program, authorizing up to 5,000 such scholarships in fiscal year 1984 and up to 10,000 scholarships in fiscal year 1985. This Department of Education program was added by the Committee on Education and Labor.

Definitions

H.R 1310 amends the definitions in the National Defense Education Act to conform them with the more recent definitions in the Elementary and Secondary Education Act and the Higher Education Act and to make them applicable to the programs in the Committee bill. For those portions of the amendment reported by the

Committee on Science and Technology, the appropriate definitions have been included.

Authorization of appropriations for the scholarships

Notwithstanding any other provision of Title VI, there is authorized $20,000,000 for fiscal year 1984 and such sums as may be necessary for fiscal year 1985.

2. Teacher initiative grants (section 102, part C of title IV of NDEA)

Part C authorizes $5 million for fiscal year 1985 for grants to teachers who have completed training under Parts A or B of Title VI of NDEA. With these grants, teachers may initiate projects to improve mathematics, science and technology education, such as purchasing classroom equipment or specialized references materials; costs of class visits to science museums, computer centers, laboratories and other sites; and costs of bringing lecturers to the classroom. Part C funds are to be distributed to States according to the same formula as Part A.

3. Summer institutes and workshops (section 103)

Section 103 of the Emergency Mathematics and Science Education Act authorizes the Director of the National Science Foundation and Secretary of Education to make competitive grants to institutions of higher education for summer institutes and workshops. These summer institutes and workshops are aimed at improving the teaching skills and knowledge in mathematics, science and critical foreign language of certified teachers in elementary and secondary schools and of educational supervisors. The summer institutes are intended to stress study in mathematics, science and critical foreign language subject content, such as new developments in science, as well as study in the skills and techniques of teaching. One purpose of the institutes is to improve the knowledge of those already teaching mathematics, science and critical foreign language. However, the legislation does not limit summer institute attendance to those teachers already qualified to teach mathematics, science and critical foreign language. The summer institutes may also offer opportunities for teachers in other fields to begin qualification for certification or recertification in mathematics, science and critical foreign language. It is expected that the inclusion of pedagogical skills in the program of the summer institutes will not only enhance the teaching skills of current mathematics, science and critical foreign language teachers, but will also provide instruction in teaching skills applicable to mathematics, science and critical foreign languages to teachers of other areas.

While most specialized mathematics, science and critical foreign language courses are offered in high schools, the foundations for both the interest and the basic skills to pursue high school science, math and foreign language courses are formed at the elementary level. It is, therefore, vital that elementary school teachers be included as participants in these summer institutes.

The inclusion of supervisors as eligible for attendance recognizes the need for department coordinators, principals and other appropriate administrative officials at the elementary and secondary

level to participate in any upgrading of content and teaching techniques which may be applied to a school or school system.

Many states have established programs and priorities to address needs for improved teacher supply and quality in the areas of mathematics and science. Some states are currently engaged in teacher institute programs which provide inservice and other teacher training programs. Most states have on hand comprehensive state inservice teacher education plans. The Federal program in support of summer institutes is intended to expand State and local efforts where they exist rather than duplicate or replace existing programs. Applicant institutions are urged to cooperate with State and local educational agencies in meeting State and local priorities for upgrading teacher skills. Summer institute programs administered by a State education agency prior to January 1, 1983 are eligible for Federal summer institute grants, with the state agency acting as the applicant.

When appropriate, the institution of higher education applying for a summer institute or workshop grant is encouraged to cooperate with the private sector. This cooperation may involve the use of privately owned equipment to structure a summer institute or workshop in an area of academic concentration where the private sector has expertise. Cooperation with the business sector may also include financial support for the summer institute through the sponsoring institution of higher education, and the loan of business personnel to contribute to the faculty of the summer institute. Cooperation with high technology firms, who can provide experiences for teachers that are on the forefront of science and technology is particularly encouraged by the Committee.

This section also requires the Secretary of Education and the Director of the National Science Foundation to each prepare a program implementation plan for the Summer Institute and workshop programs. These plans must include details of appropriate coordination between the two agencies to avoid unnecessary duplication and to provide for adequate geographical distribution in establishing these institutions. Such plans must be in the hands of Congress for at least 30 calendar days or have written notice from the relevant Committees that they have no objection to the plan. It is expected that such plans also be submitted to the Congress at the same time for proper evaluation.

4. Postsecondary mathematics, science, and critical foreign language improvement (section 104)

H.R. 1310 provides for competitive grants to institutions of higher education to improve mathematics, science and critical foreign language curricula and to provide programs for faculty development. Grants under this section are for undergraduate programs only, and are to be administered by the National Science Foundation. Applicant institutions must show coordination between the discipline(s) to be upgraded under this section and the institution's school or department of education. It is necessary that this cooperation be required for an improvement and development grant so that those students of education planning a career as precollege mathematics, science or foreign language teachers have a coordinated and quality curriculum of both pedagogy and content in

their chosen academic concentration. It is understood that some schools do not have a school or department of education and it is not intended that these institutions be excluded from eligibility for these grants.

The National Teaching Incentive Scholarships in Sec. 102 encourage students to become precollege mathematics, science and critical foreign language teachers, but do not address the quality of instruction at the institutions these students attend. It is therefore vital that in the process of increasing the quantity and quality of precollege math, science and critical foreign language teachers, that attention be given to the undergraduate programs these students pursue.

Under this section it should be recognized that a significant number of teachers are graduated from small, liberal arts colleges that do not have the resources of a large, research university. Therefore, both the quality of the proposed improvement program of the applicant and the resources currently available at that institution should be considered in the grant award process.

Twenty-five percent of funds under this section are reserved for Higher Education Act (HEA), Title III institutions. These institutions meet a formula which establishes that they serve a precominantly low-income student population. These institutions have traditionally lagged behind their counterparts in the higher education community in providing the most updated curricula and equipment in mathematics, science and foreign language and have a particular need for assistance in program improvement and faculty development which cannot be funded from institutional resources.

5. Educational research (section 105)

H.R. 1310 authorizes monies to fund investigations of effective methods of instruction and effective education programs in mathematics, science and critical foreign language, as determined by the Director of the National Science Foundation in consultation with the National Institutes of Education. It is expected that funds under this section be used to support research projects to improve mathematics, science and critical foreign language education. These studies may include: (1) research on teaching in mathematics, science and the critical foreign languages and on the instructional use of information technologies; (2) application of teaching and learning research to the local and private sector development of instructional materials and to the improvement of training programs; (3) research on the effective use of community resources such as science museums, regional centers, public television, community colleges, and local industries in the teaching of mathematics and science; (4) secondary school operations as they affect student learning in the mathematics, sciences, and foreign languages; (5) analysis of local and institutional policies enhancing or inhibiting the recruitment, retention, and improvement of faculties in these subjects, and (6) analysis of effective methods and materials of instruction used in other nations, and their potential application to the United States.

All studies supported by this section should be conducted with attention to the need for full participation of women, minorities, and the handicapped and other traditionally underrepresented groups

in school and college mathematics and science courses. Research can focus on identifying barriers to full participation, effective methods of removing those barriers, and other factors influencing the participation and achievement of racial and ethnic minorities, women, and the handicapped.

6. Minority institutions science improvement program (section 106)

H.R. 1310 also amends Section 406A of the General Education Provisions Act to reauthorize the Minority Institutions Science Improvement Program at a level of $5 million for each of the fiscal years 1984 and 1985, and is contained in the amendment to reflect the actions taken by the Committee on Education and Labor.

7. Authorization of appropriations (section 107)

Section 107 authorizes funding for those programs that fall within sections 103, 104, and 105. For the Summer Institutes program $20,000,000 is provided for the Department of Education in each fiscal year 1984 and 1985 and $15,000,000 is authorized for the National Science Foundation for each fiscal year 1984 through fiscal year 1988. $10 million and $5 million are provided to the National Science Foundation in those same years for postsecondary improvement and the educational research programs, respectively.

C. TITLE II—NATIONAL ENGINEERING AND SCIENCE PERSONNEL ACT

The thrust of Title II is twofold: (1) to provide for a national policy for technical, engineering, and scientific personnel and; (2) to provide for a special matching Engineering and Science Personnel Fund to be administered by the National Science Foundation to be used in cost-sharing programs for the precollege, college and postgraduate training of such personnel and to increase the public understanding of science and mathematics. The Committee sees the cost-sharing provision as the key element in Title II. It is essential that the vast reservoir of talent and resources of the private sector be brought to bear on the critical problem of maintaining and increasing the nation's supply of trained technicians, engineers, and scientists.

Authorization

The bill authorizes $100 million for each of the five fiscal years 1984 through 1988 to fund the Engineering and Science Personnel Fund within the NSF.

1. Federal policy on technical engineering, and science personnel

The bill provides for a continuing national policy to "maintain an adequate supply of technical, engineering and scientific personnel to insure the technological strength and security of the Nation". Although the organic acts for the Office of Science and Technology Policy (42 U.S.C. 6601) and the National Science Foundation (42 U.S.C 1861) make references to Federal responsibility regarding "science education" and "national science and technology policy," insufficient attention has been explicitly paid by these organizations to a clear policy for technical, engineering and science personnel. Because of the failure to adequately address the ques-

tion of such policy, the role of the Federal Government in dealing with these manpower issues has become increasingly unclear. The legislation seeks to clarify the Federal role in technical, engineering and scientific education and personnel.

The intent of the bill is that the policy of the Federal Government and its responsibility to provide the necessary leadership and guidance in carrying out that policy be clearly enunciated. Among those responsibilities are: the identification of technical, engineering and scientific human resource needs; establishment and maintenance of the means for continually assessing the country's manpower needs, the promotion and provision of leadership to increase the science and mathematics literacy of all citizens; provision of leadership and coordination of public and private efforts to address those needs; assistance to universities and other higher educational institutions in promoting the quality of training for graduates in science and engineering; and, finally, encouragement of the use of private sector funding to meet the needs of research and development as well as technical, engineering and science personnel needs.

Finally, the bill states unequivocally that the OSTP maintains the primary responsibility for developing policies for the Federal support of research and development and of technical, engineering and science personnel. The Committee intends that NSF and the Department of Education work closely with OSTP in exploring and analyzing related Federal programs, initiatives and policies.

2. Establishment of the Engineering and Science Personnel Fund

A special matching Fund for Engineering and Science Personnel is established within NSF. The Fund is to be used to address the priority issues in the training of technicians, engineers, and scientists. In developing its programs, the Foundation is required to take into account the current status and predictions of supply and demand in specific job categories or academic disciplines. The Federal participation in any individual grant cannot exceed 50 percent, and could be much less. It is intended that the Fund be used as seed money to initiate programs which would prove to be of such value that permanent funding from other sources would become available.

3. Priorities

The bill contains seven priority uses for the Fund. Other uses are not precluded, but it is intended that major efforts include the seven priority areas. In addition, "floors" are added for three of the priority items: community college activities, instructional instrumentation and precollege activities.

The first priority area is the recruitment and retention of new engineering faculty. The Fund has the potential to play a key role in the recruitment and maintenance of a high quality teaching and research faculty in our nation's engineering schools. Programs might be developed with the private sector to encourage and permit university engineering faculty to alternate periods of teaching with industrial opportunities, to encourage research and development engineers from the private sector to spend one or two years teaching on university faculties, to support distinguished professorships and to provide salary support of the new young faculty badly

needed in overburdened departments of engineering. These programs would all be conducted on a cost-sharing basis, and, if carefully prepared and well managed, could go far to encourage more engineers to pursue a graduate education and university teaching as an attractive and rewarding career path.

Another priority area is the development of two year and community college faculty and instructors for training of technicians and other personnel in high technology fields. Grants made in this area could lead to model programs which would provide critically needed, skilled technicians in such high-technology areas as advanced electronics, robotics, computer and information technologies, communications, optics and advanced materials and materials processing. Both instructional development activities and the provision of necessary instrumentation for the training of students are expected to be provisions of these model programs. If the programs are carefully chosen to address genuine personnel needs, they will rapidly become self-sustaining as students realize their value.

A third priority area is the development of programs for instructional instrumentation and systems for post-secondary technical, engineering, and scientific education. High technology fields are closely intertwined with the use of computers. Thus the accessibility of computers to technical, engineering, and science students is critical to their education. Outstanding opportunities exist for the development of programs both for the training of students in the use of computers and for the development of computer based programs of instruction in all areas of mathematics, science and engineering. Use of telecommunications, satellite TV and other advanced techniques could also be explored and supported through the Fund to provide access to technical training and education in critical professions of disciplines. Such a "national university" concept could take advantage of faculty and expertise available in only a few universities or regions and bring them to the workplace or to other colleges and universities throughout the country. Again, industry and other funding sources would provide iportant cost-sharing in such enterprises.

A fourth priority area is precollege science and mathematics education and training with an emphasis on cooperation and exchange of resources and personnel with industry and other parts of the private sector. An excellent example of an effort in this area is the Mathematics, Engineering and Science Achievement (MESA) program, now in 125 high schools in California, and in high schools in Colorado, New Mexico, and Washington. The purpose of the program is to graduate high school students with three to four years of math, science and english. The MESA program is partially supported by a number of major California companies and foundations and depends heavily on the use of industry and university personnel in helping the school with the program. It is an excellent example of the opportunities that exist for cooperation between school systems and industry and other private sector organizations.

Priority should be given to activities which increase the public understanding of science and mathematics and which involve the development and dissemination of instructional materials and re-

sources for the improvement of mathematics, engineering, and science education.

Finally, priority is given to addressing the needs of four year colleges to retain and upgrade the skills of their faculty and to expand their teaching capabilities in high technology fields such as engineering and computer science. In these areas four-year colleges suffer from the same problems as their university counterparts, and the Committee recognizes these needs.

The bill specifies that not less than 20 percent of the funds will be spent in the two year and community college program development areas, not less than 15 percent on the development of program for instructional instrumentation and systems, and not less than 15 percent in the area of precollege science and mathematics education.

4. Coordination of activities

The Office of Science and Technology Policy is the appropriate Federal organization to coordinate the science, mathematics and critical foreign language educational activities between the National Science Foundation and the Department of Education. OSTP is therefore given the responsibilities of coordinating the activities of two agencies, excluding those parts pertaining to Title VI (A) of the National Defense Education Act of 1958 in Title I of this Act.

Reports

The bill requires that, starting one year after enactment of the Act, the National Science Foundation and Department of Education will submit a joint report on their activities under this act to the Congress. The report will be required biennially after that.

V. Section-by-Section Analysis of Selected Sections

The Committee on Science and Technology excluded from its consideration Part A of the new Title VI of the National Defense Education Act.

TITLE I

Section 101. Short Title: "Emergency Mathematics and Science Education and Jobs Act".

Section 102(a). The National Defense Education Act of 1958 is amended to include a new title: "Title VI—Emergency Mathematics and Science Education".

PART A—ELEMENTARY AND SECONDARY ASSISTANCE

Section 601. Findings

The Congress finds that in order to enhance economic productivity and provide the necessary number of skilled individuals to meet national defense needs, it is necessary to improve the quality of instruction in mathematics and science as well as increase the quality and quantity of teachers in these areas at the elementary and secondary levels. By doing so there will be new jobs added to the national economy.

PART B—POST SECONDARY ASSISTANCE

Section 621. Findings

There is a need to encourage college and university students to become mathematics, science and foreign language teachers and to improve the postsecondary instruction of these students in order to strengthen the educational foundation of this Nation. Members of groups now under represented in mathematiecs, science and foreign language must be encouraged to pursue teaching carreers in these areas. Also, the quality of instruction for future teachers in these areas must be improved and the National Science Foundation will be utilized when developing and monitoring programs designed to improve such instruction. It is necessary to provide enriched opportunities for current teachers. Current teaching techniques, including classroom equipment and community resources, and methods of improving instruction must be evaluated.

Section 622, National Teaching Incentive Seholarships

Funds in this section will be used for National Teaching Incentive Scholarships. The amount of these scholarships cannot exceed the amount equal to tuition and fees for two academic undergraduate years and will be paid only upon proof of satisfactory achievement in the preceding year. Each scholarship will have a minimum amount of $1,000 and cannot exceed 5,000. Not more than 5,000 national teaching incentive scholarships will be awarded in fiscal year 1984 and not more than 10,000 for fiscal year 1985. The Secretary of Education may reserve up to thirty percent of the incentive scholarships monies for current teachers for one year of academic study. The Secretary may also reserve up to ten percent of these funds for incentive scholarships for individuals pursuing study of a critical foreign language.

The chief State education officer responsible for post secondary education will provide the Secretary of Edcuation with the names and qualifications of individuals who are qualified to receive incentive scholarships. The number of such names cannot exceed the product of the number of members of Congress from that state multiplied by twenty. The submission of names must be accompanied by suitable academic credentials and a personal statement expressing a commitment to pursue a carrer in teaching. The recipients of the national teaching incentive scholarships will be selected by a special selection Committee.

To be eligilbe for an incentive scholarship an individual shall have completed at least two years toward a baccalaureate degree and formally expressed the intention to teach elementary or secondary math, science or critical foreign language for at least two years for each year of assistance received or repayment of the scholarship plus interest.

Section 623. Authorization of Appropriations

The sum of $20,000,000 is authorized for this section for fiscal year 1984 and such sums as may be necessasry in 1985.

PART C—TEACHER INITIATIVE GRANTS

Section 641. Authorization of appropriations to the Department of Education

Authorizes $5,000,000 to the Department of Education for fiscal year 1985.

Section 642. Allocation of appropriations

Requires that appropriated funds be allocated in the same manner as in Part A of Title I of H.R. 1310. This includes setting aside one percent total for the Pacific and Virgin Islands, one-half of one percent to the Bureau of Indian Affairs, and the balance to the states and D.C. as follows: (1) one-half of remainder to be allocated as required by Section 302(a)(1) of the National Defense Education Act and (2) one-half of remainder to be allocated by a different formula that takes into account the number of school age children and the per pupil expenditure in each state.

Section 643. Use of funds

Provides funds to be used for teacher initiated projects. Teachers must have completed in-service or other training under Parts A and B of the newly created Title VI. Funds may be used to purchase equipment and reference materials, for the costs of field trips to museums, laboratories, and other scientific institutions, and to bring into the schools special equipment and lectures for student and faculty enrichment. The use of the funds is not restricted to the above.

The state may reserve up to one percent of the funds received for administrative costs.

Section 102(b). This Section provides definitions for terms in part (A).

SECTION 103.—SUMMER INSTITUTIONS

Section 103. Summer institutes and workshops

Under this section, the Secretary of Education and the Director of the National Science Foundation can make grants to institutions of higher learning, as defined in section 1201(a) of the Higher Education Act of 1965, in order to support summer institutes and workshops for supervisors and teachers in elementary and secondary schools to improve the knowledge and skills in the areas of math, science, and critical foreign languages. The cooperation of private firms will be involved to the extent possible.

The Secretary of Education and the Director of NSF will each prepare an implementation plan for the Summer Institute program which provide for corrdination of these programs by the Department of Education and the NSF. No funds may be obligated unless approved by the appropriate congressional committees have been notified.

Section 104. Postsecondary mathematics, science and critical foreign language improvement

Under this section funds will be made available by the Director of the National Science Foundation for competitive grants to insti-

tutions of higher education, as defined by Section 1201(a) of the Higher Education Act of 1965 for undergraduate math, science, and critical foreign language curriculum improvement and faculty development, in consultation with the school of education at that institution. Twenty five percent of the funds in this section are reserved for those institutions serving a high proportion of low students.

Section 105. Investigations of effective educational methods and programs

The Director of NSF, in consultation with the Director of the National Institute of Education, shall conduct studies of methods of instruction and educational programs, including technical literacy and full participation of women and racial and ethnic minorities. Such studies in the areas of science, math and foreign languages may include the following: (1) teaching and learning research in math, science and foriegn languages as well as instructional uses of information technologies; (2) application of research to private sector development of instructional materials and teacher training programs; (3) research on the effective use of community resources such as public television and community colleges; (4) study of secondary school operations and their effect on learning; and (5) analysis of local policy and its effect on teacher retention and recruitment in math, science and foreign languages.

Section 106. Minority institutions science improvement

Section 406 A of the General Education Provisions Act is amended to authorize $5,000,000 for each fiscal year 1984 and 1985 for the purpose of carrying out the Minority Institutions Science Improvement program.

Section 107. Authorization of appropriations

The sum of $20,000,000 is authorized for the Department of Education for each fiscal year 1984 and 1985 to carry out its responsibilities for the Summer Institutes (Section 103). $30,000,000 is authorized for the NSF for fiscal years 1984, 1985, 1986, 1987, and 1988 in the following manner: One-half shall be availabe for the Foundation's responsibility for the Summer Institutes (Section 103); one-third for the Foundation's responsibility for Postsecondary Mathematics, Science, and Foreign Language Improvement Program (Section 104); and one-sixth will be available for the Foundation to carry out its responsibility for Investigations of Educational Methods and Programs (Section 105).

TITLE II—NATIONAL ENGINEERING AND SCIENCE PERSONNEL

Section 201. This title may be cited as the "National Engineering and Science Personnel Act of 1983".

Section 202. Findings and Purposes

Technical, engineering, and scientific personnel are an integral part of the nation's economic and national security needs and are necessary for growth and international competitiveness, particularly in the fields of electronics, information technology, energy, and

foreign languages. Public understanding of science and math is related to increasing the number of individuals interested in scientific careers as well as lending proper support to education. The nation needs a comprehensive policy regarding the Federal role in this area. The nation faces a shortage of graduate engineering faculty and researcher as well as scientific and technical personnel. Women and minorities are not being attracted in sufficient numbers to scientific, engineering, and technical areas.

Section 203. Policy

It will be the policy of the United States to maintain an adequate supply of technical, engineering and scientific personnel and the President shall coordinate Federal activities to carry out this policy. These activities include: (1) Identify necessary human resources, including the need to maintain knowledge of foreign technical developments, (2) establish a means for continually assessing long and short term manpower needs, (3) promote increased public understanding of science and math, (4) provide coordination of public and private sectors, including professional societies, in carrying out this Act, (5) assist institutions of higher education in assuring adequate quality of instruction, research, and manpower, and (6) encourage private sector support in these efforts. The Office of Science and Technology Policy is designated as having the primary responsibility for developing policies for Federal R&D and scientific, engineering, and technical personnel. Each Federal department and agency which establishes programs for training of technical and engineering personnel or cooperates with State and local governments in such programs shall coordinate its activities with the Office of Science and Technology Policy.

Section 204. Establishment of engineering and science personnel fund

This section establishes a special Engineering and Science Personnel fund, to be administered by NSF, for the purpose of developing and promoting the quality of technical, scientific and engineering personnel. NSF can expend money for grants for research, fellowships, capital equipment, salaries, instrumentation and other activities. Money for grants will be available through a system of matching grants with private or other public sector funds with money from the Fund not to exceed one half the total cost of the program supported by such grant. The Fund will be established for five years and the NSF is to report to the Congress no less than once every two years on expenditure of money under the Fund.

Section 205. Priorities for use of fund

The fund will focus its priorities on the following areas: (1) Recruitment and retention of new engineering faculty; (2) two year and community college faculty and instructor development in high technology fields; as well as model instructional programs and instrumentation; (3) instructional instrumentation programs at the postsecondary level; (4) precollege math and science education, including private sector involvement; (5) public understanding of science and math; (6) development of instructional materials for math, science and engineering; (7) faculty enrichment at four year

postsecondary institutions. The two year and Community College faculty development portion will receive not less than twenty percent of the funds available from the Fund. Instructional instrumentation will receive not less than fifteen percent of the monies available and precollege math and science education and training will receive not less than fifteen percent.

Section 206. Coordination of activities; reports

OSTP will have responsibility for coordinating the activities of the Department of Education and the NSF under this Act. Within one year of enactment of this Act the Department of Education and NSF shall provide Congress with a joint report on their activities under this Act and will report again to the Congress not less than every two years.

Section 207. Authorization of appropriations

For the Engineering and Science Personnel Fund there is authorized to be appropriated $100,000,000 for each fiscal year 1984, 1985, 1986, 1987, and 1988.

VI. Committee Views

A. NATIONAL TEACHING INCENTIVE SCHOLARSHIPS

The Committee views the scholarship program in H.R. 1310 as a key tool in the effort to eliminate the shortage of qualified mathematics and science teachers. Mathematics and science are among the most difficult subject areas in any education institution. The Committee hopes that the availability of financial support will encourage able students to take the more difficult curriculum required to become a certified teacher in mathematics, sciences, or one of the critical foreign languages. It is the Committee's intent that these scholarships go only to those who show by their previous academic work to be clearly preparing for a career in elementary or secondary school teaching, though it is not intended that those majoring in the sciences or mathematics but desiring to teach be excluded from consideration. In fact, some effort should be made to bring such students into the teaching profession through these scholarships. It is also the Committee's intent that the teaching requirement be fulfilled by consecutive years of teaching beginning as soon as possible after completion of the student's course of academic studies.

The Committee intends that the scholarship program be administered to provide every encouragement to minorities, women and the handicapped who apply. The Committee wishes to encourage more teachers from groups currently underrepresented in the respective disciplines. However, the Committee makes clear that it expects all scholarships to be rewarded on merit and that a quota system is not intended.

B. CRITICAL FOREIGN LANGUAGES

The Committee intends that the critical foreign language study and research programs which are referred to in various provisions of this bill are those languages which are most important to the

assessment of the activities of other nations in science, engineering, and industrial research and development in all areas, but most importantly, those areas commonly considered to be high technology ones. Japanese is an example of such a language. The Committee does not intend to define a list of foreign languages as it believes that flexibility is needed to adjust to changing competitive and national security conditions. Rather, the Committee intends that "critical foreign languages" shall be those determined by the Secretary of Education in consultation with the Department of Defense, Department of Commerce and other appropriate federal agencies to be of vital importance to the national economic and security interest.

C. SUMMER INSTITUTES AND WORKSHOPS

Summer Institutes were an extremely effective method of updating the skills of American teachers and educational supervisors in the post Sputnik era of the 1960's. Had they been continued until now, the country's education problems would certainly be of a lesser degree. Thus the Committee is a strong supporter of the proposed new program of summer institutes and workshops. While funds for these institutes and workshops are distributed between the National Science Foundation and the Department of Education, it is the Committee's intent that the nation shall have but one, coordinated summer institute program for teachers and supervisors in mathematics, science and critical foreign languages. The Committee expects the two agencies to work closely together in developing the summer institute program. As noted more fully below, it is the Committee's view that the Department of Education is the agency best qualified to conduct summer institutes to upgrade teaching skills while the National Science Foundation connection is needed to bring forward the technical expertise necessary for the development of effective program content. The Committee also fully expects the Office of Science and Technology Policy to take whatever coordinating steps are needed in this regard.

The Committee strongly believes that both the Department of Education and the National Science Foundation have a role to play in the establishment and administration of a new progam to support summer institutes and workshops for precollege teachers and supervisors.

In the past the National Science Foundation has supported a series of highly successful summer institutes. These institutes aimed to provide in depth scientific and/or mathematics knowledge to its participants who were primarily high school teachers responsible for college preparatory students. These institutes impacted positively on many thousands of teachers and, in turn, upon their students.

More recently, the fiscal year 1983 appropriations bill for the NSF (Public Law 97-272) calls for the establishment of a "precollege" activity to improve teacher training and skills development. The status of this and its implementation plan is still uncertain. However, it is the intention of the Committee that no legislative authorities established in Sec. 103 in any way interfere with, or

supplant, the plans that emerge from the FY 1983 appropriations mandate.

The National Science Foundation institutes have drawn upon the highly technical and scientific knowledge that is necessary to upgrade the subject matter content of the teacher. As a Federal science agency with broad ties to academic sciences and engineering, NSF has a unique responsibility to foster the involvement of professional scientists and engineers in the improvement of education in the sciences, mathematics and technology at all levels. This is particularly important because of the rapid advances of these fields.

The purpose of the Department of Education administered institutes will be to upgrade teaching skills of elementary and secondary school personnel. This will insure that teachers will be equipped with techniques to enable them to communicate their scientific knowledge effectively in a classroom setting.

The Committee feels that these institutes will provide an important linkage between institutions of higher education and local schools and school districts. This is clearly intended in the Education and both Committee's report language explaining Part A of Title VI (which is created in Sec. 102) which encourages local school districts to use available funds to support attendance at these institutes. The Committee believes that the mechanisms in this Section and Sec. 103 of H.R. 1310 will initiate desired cooperative efforts between all levels of education in the implementation of math and science education in elementary and secondary schools, thus stengthening the impact of these Department of Education run institutes.

The Committee is of the opinion that dually administering summer institutes is the most effective means to successfully provide teachers with both the improved scientific knowledge and teaching skills necessary to readdress existing inadequacies in the precollege science and math classroom. Both types of institutes are a necessary part of our revitalized Federal science education initiative.

In any program dually administered by two agencies as diverse as the Department of Education and the NSF, efforts to achieve collaboration and coordination must be carefully considered. The Committee feels that the program implementation plan established in Sec. 103(b), the mandated joint report to Congress in Sec. 206(b) and the role of the OSTP outlined in Sec. 206(a) are essential to these collaboration efforts.

In addition the Committee urges that the Department of Education evaluate its proposals for summer institutes through a peer review process involving consultation with NSF to identify field readers; conversely, the NSF should use field readers identified by the Department of Education, with particular and relevant competence in teaching skills.

Further, the Commttee recommends that the Department of Education administered institutes be coordinated through schools, colleges or departments of education in cooperation with departments of science and math. This would build upon the already established relationships between these collegiate groups and local school districts.

Funds under section 103 may also be used to support workshops other than summer institutes. The Committee recognizes that not all teachers are free to attend training institutes during the summer. The Committee wishes to emphasize, however, that it expects the bulk of the funds to be used for summer institutes and that it expects the other workshops to be an integral part of the overall program developed by the two agencies.

It is the intent of the Committee that those participating in the Summer Institutes and Workshops programs be supervisors or teachers in elementary or secondary schools. Some states do not have requirements for certification so the word "certified" has been struck from this section. Though it is not required that such teachers or supervisors be certified, it is the Committee's intent that such participants meet at least the minimum requirements required for teaching in the private or non-public schools within a particular state. In addition, it is intended that such programs also provide for allowing at least some portion for training people who have outstanding experience in science, mathematics or engineering but for one reason or another are not permanently certified or currently fully accredited as educators. The required certification would then be possible through such programs.

The Summer Institutes and Workshops programs are to be focused on teaching of sciences, including technology, mathematics or critical foreign languages at the elementary or secondary school educational levels. It is the Committee's intent that such programs not be expanded to include discipline areas outside of those specifically named above.

Finally, it should be noted that the Department is authorized for only two years and the Foundation for five. It is not intended that NSF supplant the Department's activities at the end of two years. Rather, it is expected that Congress should reauthorize the Department's program with the view to expand it if its evaluation is positive.

Postsecondary mathematics, science and foreign language improvement

While concurring with the Committee on Education and Labor on the importance of curriculum and faculty improvement for postsecondary mathematics, science and critical foreign languages the Committee believes a competitive grants activity of this nature can best be administered by the National Science Foundation. However, it is intended that NSF work closely with the National Institute of Education (NIE) in establishing these particular programs.

The Committee intends that programs approved for funding under the Summer Institutes and Workshops provision of the bill be of sufficient duration, continuity, and intensity that those who receive training will emerge from their experience with truly updated skills or with adequate retraining. It was this wish to provide effective programs which led the Committee to suggest summer institutes as the main means of accomplishing the task.

At the same time, the Committee members do not wish to tie the hands of those designing programs to fit the needs of particular states or localities. For this reason, workshops carried on during the regular academic year are also allowed under H.R. 1310. The

criterion which should be used in designing all programs is that the program recipients should emerge from training able to teach science or mathematics courses with skill and ease.

D. EDUCATIONAL RESEARCH

While not specified in the legislation, the Committee believes that the objectives of this section would be best served by a competitive grants program. For that reason the Committee has assigned the Foundation responsibility for the conduct of these studies, after close consultation with the National Institute of Education. The Committee expects such consultation to be frequent and ongoing so as to apply the best talent of both agencies to the evaluation of the proposed research activities of this section.

E. TITLE II. THE NATIONAL ENGINEERING AND SCIENCE PERSONNEL ACT

1. Cost-sharing

As part of the overall philosophy of H.R. 7130, cost-sharing and collaboration between the Federal Government and non-Federal public and private sectors provided essential elements of the legislation. The Committee feels strongly that the Federal Government should work closely with industry, academia and the state and local governments in exploring imaginative new ways to support initiatives for developing technical, engineering and science personnel. It is clear to the Committee that resolution of the complex problems of our national education and manpower needs will require each of the concerned sectors to participate and carry their fair share of the costs, as well as other responsibilities. It is for this reason that the Committee has provided for matching monies as an integral part of the Engineering and Science Personnel (ES&P) Fund and recommended, where appropriate, such cost sharing in the legislation.

It is the Committee's views and expectation that the matching funds from the non-federal sector will come in large part from the industrial and business sectors which have the most striking need for trained technical personnel. However, the use of state and local government support should not be neglected, particularly in consideration of relevant precollege programs and undergraduate programs. Recognizing that the diverse needs and interests of the Federal sector cannot always be met by funds available in the National Science Foundation, the Committee has also provided for flexibility in the legislation to allow for some use of interagency or interdepartmental matching funds where it is found appropriate and necessary.

The Committee recognizes that the monies made available under this legislation, when compared with the $200 billion annual costs in precollege public education alone, cannot resolve all the problems and issues currently seen. Rather it is the Committee's view that the monies made available under the special Engineering and Science Personnel Fund be considered as "seed" money to evaluate particular initiatives which, if proved successful, would find more permanent funding from appropriate Federal or non-Federal institutions.

2. Policy formulation and coordination

The Committee feels strongly that comprehensive policy formulation, decision making and coordination of the Federal efforts in this area are critical to the intent and proper implementation of this legislation. The Office of Science and Technology Policy in the Executive Office of the President is the organization which the Committee believes should have primary responsibility for the development of policies to maintain an adequate supply of technical, engineering, and science personnel and for the coordination of Federal program efforts proposed in this bill. It is expected that the Office work closely with the heads of the National Science Foundation and the Department of Education in carrying out the various programs, particularly in post-secondary education activities as provided for in the Act.

3. Program distribution

Title I of this bill is concerned largely with the problems that this country faces in mathematics, science and foreign language education at the precollege level. Therefore, the Committee believes that Title II of the bill should concentrate much of its efforts on assisting post-secondary institutions in their efforts to augment the pool of technically trained manpower in this country. Precollege activities are not excluded from support under Title II. In fact, the Committee considers the cost-sharing concept embodied in the Fund to be as important to introduce at the precollege level as at higher levels of education. Because the Committee feels that it is so important to attract the private sector to become involved in precollege science and mathematics education activities on a cost-sharing basis, it has mandated that at least 15 percent of the fund must be spent in this area as one of a number of priorities for the personnel fund.

Section 204 provides for "research (related to education in mathematics, science and engineering)." The Committee specifically believes that the Fund should be used to support such education related studies in undergraduate and school mathematics, science, and engineering-technical education. Some of these studies should specifically apply teaching and learning research, and research-based understanding of human cognition to the expansion of knowledge and the development of education in mathematics, science, technology, and engineering. The Foundation should support activities which merge knowledge of effective teaching strategies and learning modes with substantive knowledge in the areas of mathematics, science, and engineering. The Committee cautions the Foundation from making any errors of focusing only on substantive knowledge, to the neglect of effective instructional delivery. Similarly, a focus on the teaching process to the neglect of substantive knowledge would also be a mistake.

The Committee believes that the actions taken towards strengthening specific fields of undergraduate and graduate engineering and science education should have a focus on readily identifiable short term needs of the next two to five years, though many of these needs will also be long term ones if not promptly addressed. Therefore, other priority needs, in the Committee's view, are (1) for

programs to address the problems of recruiting and retaining engineering faculty, (2) for the development of programs for the training of faculty and instructors for technicians in high technology areas by two-year and community colleges, (3) for the provision of computer accessibility and programs of instructional instrumentation for use in post-secondary schools, and (4) for programs to develop and then widely disseminate new materials, new curricula, and other new resources in the fields of technical, engineering, and science education.

The Committee also considers programs to improve the public understanding of science and mathematics to be of high priority. Intelligent decisions in a technological society can only be made by a scientifically literate public. The dramatic growth and success of key magazines devoted to science and the popularity of TV programs such as NOVA and COSMOS attest to the desire of the public for scientific information. The Committee believes that there is a great opportunity to leverage modest Federal funding with private sector funds to develop significant programs in this area.

4. Priorities for use of funds

(1) Recruitment and retention of new engineering faculty

It is the Committee's view that the highest priority use for the Engineering and Science Personnel Fund is a coordinated and well thought-out attack on the problem of recruiting and retaining new faculty in the fields of engineering. It is the interest of the Committee that the projects funded complement, not supplant, current NSF programs focused on new engineering faculty. Proposed NSF programs in this area generally emphasize grants to individual faculty members for research and/or equipment acquisition and will be, for the most part, funded completely by NSF. The Committee believes that the E&SP Fund, which is at least a 1:1 matching fund program, would be most effective if used to supplement such activities, including industrial exchange programs with Departments, or entire four year institutions. Programs should also be directed to improving recruitment of graduate students in the support of predoctoral and post-doctoral teaching of engineering. The Committee places strong emphasis on obtaining the involvement and support of industry in programs support by the Fund. Industry is the main employer of engineers and it is clearly in their self-interest to have an adequate supply of technical manpower available. The Committee believes that industry is rapidly coming to the same conclusion, and that the time is ripe for the development of strong cooperative efforts to maintain and expand the teaching and research capabilities of four year college and university schools of engineering.

(2) Two-year and community college instruction and faculty development

Section 205(a)(2) and 205(b)(1) earmark 20 percent of the Engineering and Science Personnel Fund for two-year and community colleges to provide high competence technician training in high-technology fields. The Committee realizes that NSF has traditionally not been involved in community college programs. However, in view of the critical importance of technician training to the future

of high technology industries, the committee believes strongly that the NSF must take responsibility for developing and demonstrating the most effective programs for technician training. The Committee intends that funds under this section be used to develop and conduct model instructional programs, to purchase and lease appropriate instructional equipment, and to provide opportunities for professional faculty development. The Committee specifically intends to require that funds be distributed with balance among these purposes with not more than 50% of such funds being used for any one purpose.

It is the Committee's view that a major emphasis in funding be on model instructional programs to provide technician training in view of the central role technicians must play in our future economy. NSF is encouraged to direct its efforts to establish and improve instructional programs which are especially designed to serve displaced and long term unemployed workers. The Committee intends that the NSF shall support community college instructional programs that include partnerships with private employers and, in awarding grants, assure a wide geographic distribution of funds so that developments in this area will provide a nationwide base for future progress.

Section 205(a) also authorizes use of funds to provide necessary state-of-the-art instructional equipment and instrumentation for effective technician training. The Committee encourages NSF to exercise careful judgment to insure that all equipment supported in this program be essential for instruction. Non-instructional equipment would be outside the intent of this bill. Given the high cost of technical instruments and its rapid obsolescence, the Committee intends that the NSF shall require specific controls on equipment expenditures to assume the most effective use of funds committed in this area.

This section also authorizes use of funds for professional faculty development activities to improve instructional skills to meet the need for future technicians. The Committee recognizes that a major goal of his program must be faculty opportunities for continuing professional development and encouragement to keep their skills and knowledge in technical areas as up to date as possible.

The Committee wishes to emphasize that these funds are not intended to be used to support on-going training programs. These funds are intended to support the development of model programs. Applicants should submit well thought-out, competitive proposals which clearly document the need to develop a training program in a specific area of high technology. Typical projects might be the acquisition of equipment and instruments unique to the field of study, the development of new courses of instruction, and the upgrading through formal or informal training of the instructional faculty. Funds may be used for salary support while the model program is in a "start-up" mode only. The Committee views the matching requirement to be of critical importance to this program. The willingness of industry, local and state governments, or the colleges to provide half or more of the support for the development of a specific new program is, in the Committee's view, one indication that a market for the graduates of the program does, in fact, exist. The Committee anticipates that successful programs meeting

a genuine need find continuous support from the local level. The development of programs which address high technology industry needs for trained manpower is every bit as critical for skilled technicians as for engineers. The approach embodied in this bill is, in the Committee's view one which will result in new, and needed programs to meet the needs of the high technology industries of the nation.

(3) Computer accessibility

The application of computing has rapidly expanded from basic calculating functions to complex information processing. Higher education has been slow to respond to the challenges and opportunities of the new information technologies. Currently, over 2 percent of the higher education budget is devoted to computing. Although more than one-half of these funds are used for administrative applications, relatively few resources are expended for instructional and research applications. However, through new technological developments and cooperative university-industry ventures, a few leading universities are experimenting with making personal computers available for every student.

The Committee finds that there is a serious gap in higher education between the computing needs of faculty and students and the resources available. The Committee believes that significant revamping of existing facilities, networks, curriculum development, etc., is required to support growth and change necessary to accommodate students who need and want to learn to use computers. In addition, computing and information processes in universities will require systematic planning by facility, students, and administrators to provide effective learning experiences with already limited resources. Therefore, the Committee directs the Foundation to establish a program for institutions of higher education designed to enhance instructional computing and computer accessibility for students and faculty.

Universities must respond to the rapid technological changes in information science and technology in order to maintain the relevance and quality of education, to improve productivity, and to take advantage of instructional and research opportunities. The Committee believes the funding priority for computer accessibility is imperative to bridge the gap between computing needs and resources. These funds will also assist in fulfilling the critical shortage of personnel educated to use these new technologies.

(4) Precollege science and mathematics education and training

The Committee believes that there is an important role for a cost-sharing program in the nation's efforts to upgrade the quality of science and mathematics education in our elementary and secondary schools. Thus the Committee views support on a cost-sharing basis of creative precollege initiatives in mathematics and science education and training to be a priority use of the Fund to which not less than $15 million must be devoted.

The Committee's intent is to allow as much flexibility as possible to NSF in administering this program. However, the Committee does not intend that projects supported by the Fund duplicate ac-

tivities authorized under other sections of this Act or other programs within NSF. The Committee sees cost sharing as a valuable tool in the promotion of cooperation and exchange of resources and personnel with industry and other parts of the private sector. The Committee wishes to emphasize, however, that it does not expect all programs that address precollege mathematics and science education must involve cost-sharing. There are programs in which cost-sharing is either difficult or inappropriate, and the Committee does not expect the NSF to require cost-sharing where it has not been legislatively mandated.

(5) Public understanding of science and mathematics

The Committee believes that the citizens of this country recognize that we live in a society in which many of the decisions they and their elected representatives must make are complex, technological ones. The success of magazines and television programs devoted to science and technology is indicative of this recognition by the public. The Committee sees opportunities to use the rapidly developing field of communication technology to great advantage in fostering public understanding in the fields of science and mathematics. Technologies such as television and radio broadcast, cable, satellite, video recorders, and microcomputers offer the ability to disseminate materials by broadcast, on tape, and as software as well as more traditional means. The Committee visualizes a program with wide participation of both public and private organizations in a variety of media in pursuing the objectives of this priority.

(6) The Development and Dissemination of Instructional Materials and Other Resources

The Committee views the development of instructional materials and other resources at all levels of education, but especially the precollege level, to be an important priority. Even more importantly, the Committee considers the development of mechanisms to disseminate materials whether the form is print, film, software, or other media and whether the material is a single text or a complete curriculum to be critical to the success of the nation's effort to address our problems in technical education. The most exciting curriculum or the best computer program is useless unless it gets into the hands of potential users. Clearly, the presence of a well thought-out plan to disseminate the results of projects and programs if they prove to be successful should be a required item in all proposals to NSF.

(7) Four-year college faculty and instructors development

Faculty at four-year colleges have a particularly difficult time attempting to conduct research programs of merit. The teaching load at four-year institutions is usually heavier than at research universities, and all research must be carried out with undergraduates who are usually less skilled and thus need more guidance than graduates. As a result four-year institutions are less attractive to research minded faculty than the major universities. Yet four-year institutions will probably be the main source of a quality pool of Bachelor's level high technology personnel such as engineers and

computer scientists. Thus, it is the Committee's view that the recruitment of new faculty and the retention of all faculty in the high technology fields of engineering and computer science is every bit as important in four year colleges as in our research universities, and the Committee intends that the views expressed in the first priority in this section apply also to four-year colleges.

5. Women and minorities

It is the Committee's view that women and minorities represent an underutilized resource in meeting the nation's technical, engineering and scientific human resource needs. In following with the Committee's continuing position in this regard, the Committee directs that each of the programs established under the provisions of this legislation provide for specific attention to incorporating women and minorities into the technical, engineering and scientific human resource pool.

VII. Legislative History

H.R. 1310 was introduced by Mr. Perkins (for himself, Mr. Fuqua, Mr. Hawkins, Mr. Ford of Michigan, Mr. Burton of California, Mr. Gaydos, Mr. Clay, Mr. Biaggi, Mr. Andrews of North Carolina, Mr. Simon, Mr. Miller of California, Mr. Murphy, Mr. Corrada, Mr. Kildee, Mr. Williams of Montana, Mr. Kogovsek, Mr. Washington, Mr. Martinez, Mr. Owens, Mr. Harrison, Mr. Boucher, Mr. Walgren, Mr. Wirth, Mr. Dymally, Mr. Nelson of Florida, Mr. Brown of California, Mr. Harkin, and Mr. McCurdy) on February 8, 1983. H.R. 1310 is a fusion of H.R. 30 and H.R. 582. H.R. 1310 was jointly referred to the Committees on Education and Labor and Science and Technology.

The committee on Education and Labor met on February 8 for the purpose of marking up the bill. After discussion, the Committee ordered the bill, as amended, favorably reported to the House by a vote of 27 to 3.

The Committee on Science and Technology held two days of hearings on H.R. 1310. The first hearing was held on February 9, 1983 with Hon. Carl D. Perkins, Chairman of the Education and Labor Committee, and Hon. Paul Simon, Chairman of the Subcommittee on Postsecondary Education as the witnesses.

On February 16, 1983, the following witnesses testified: Hon. William F. Goodling; Hon. Timothy E. Wirth; Hon. Jon L. Mills, Florida House of Representatives; Dr. Craig Phillips, Superintendent of Public Education, State of North Carolina; Dr. James Gant, Florida State University; Dr. Maryly Peck, Polk Community College; Dr. Frances Holland, Allegheny County Community College; Dr. Evelyn Handler, University of New Hampshire, Dr. Jon Fuller, Great Lakes Colleges Association; Dr. Robert Gillespie, University of Washington; Dr. Richard Van Horn, Carnegie-Mellon University; Dr. David H. Florio, American Educational Research Association; Mr. Dan Dimancescu, Technology and Strategy Group; Mr. Robert Finnell, MESA; Dr. Joe Pettit, Georgia Institute of Technology; Mr. Jack Geils, American Association of Engineering Societies; Mr. Jerry J. Jasinowski, National Association of Manufacturers; Mr. Bill G. Aldridge, National Science Teachers Association.

On February 22, 1983 the Committee met for the purpose of marking up the bill. The Committee voted unanimously to report H.R. 1310, as amended, for further consideration by the full House.

VIII. Inflaton Impact of the Bill

In accordance with Rule XI, Clause 2(1)(4), of the Rules of the House of Representatives, this legislation is assessed to have no adverse inflationary effect on prices and costs in the operation of the national economy.

IX. Committee Oversight Findings and Recommendations

Pursuant to Rule XI, Clause 2(1)(3), of the Rules of the House of Representatives, under the authority of Clause 2(b)(1) and Clause 3(f), Rule X, the Committee's oversight findings and conclusions are reflected in the recommendations found in the present bill and report.

X. Summary of Committee on Government Operations Findings and Recommendations

Pursuant to Rule X, Clause 2(b)(2), and rule XI, Clause 2(1)(3) of the rules of the House of Representatives, no findings or recommendations have been submitted by the Committee on Government Operations for inclusion in this report.

XI. Budget Analysis and Projection

U.S. Congress,
Congressional Budget Office,
Washington, D.C., February 25, 1983.

Hon. Don Fuqua,
Chairman, Committee on Science and Technology,
U.S. House of Representatives, Washington, D.C.

Dear Mr. Chairman; Pursuant to Section 403 of the Congressional Budget Act of 1974, the Congressional Budget Office has prepared the attached cost estimate for H.R. 1310, the Emergency Mathematics and Science Education Act and the National Engineering and Science Personnel Act of 1983, as ordered reported from the House Committee on Science and Technology February 22, 1983.

Should the Committee so desire, we would be pleased to provide further details on this estimate.

Sincerely,

James Blum
(For Alice M. Rivlin, Director).

The bill provides for new authorization rather than new budget authority, and, consequently, the provisions of section 308(a) of the Congressional Budget Act are not applicable.

XII. Congressional Budget Office Cost Estimate

Pursuant to section 403 of the Congressional Budget Act of 1974 and Rule XI, Clause 2(l)(3) of the Rules of the House of Representatives, the report of the Congressional Budget Office follows:

1. Bill number: H.R. 1310.

2. Bill title: The Emergency Mathematics and Science Education Act and the National Engineering and Science Personnel Act of 1983.

3. Bill status: As ordered reported from the House Committee on Science and Technology, Febraury 22, 1983.

4. Bill purpose: The main purposes of this bill are: (1) to authorize new grants within the Department of Education and the National Science Foundation (NSF) to improve elementary, secondary and postsecondary education in mathematics and science, and (2) to authorize matching grant funds within the NSF to train engineering, technical and scientific personnel. This bill is subject to subsequent appropriation action.

5. Estimated cost to the Federal Government:

[By fiscal year, in millions dollars]

	1984	1985	1986	1987	1988
Department of Education (Function 500):					
Authorization level	290	316	.....	.....	.....
Estimated outlays	145	303	158	.....	.....
National Science Foundation (Function 250):					
Authorization level	130	130	130	130	130
Estimated outlays	13	78	117	130	130
Bill total:					
Authorization level	420	446	130	130	130
Estimated outlays	158	381	275	130	130

Basis of estimate: It was assumed for purposes of this estimate that the bill would be enacted prior to the beginning of fiscal year 1984, and that all sums authorized would be appropriated.

Department of Education: The Department of Education programs under Title I are authorized for two years. The authorization levels for these elementary, secondary, and postsecondary education grants for fiscal year 1984 are those stated in the bill. The 1985 level is based on the 1984 specified levels and inflated by projected costs increases for education. The minority institutions science improvement program is currently authorized through 1984 at $5 million. This authorization is extended for one year.

Based on conversations with Committee staff, it was assumed that the Department of Education programs would be appropriated on a current year rather than a forward funding basis. Given the nature of these grants, outlays are estimated to be approximately 50 percent the first year and the remainder in the second.

National Science Foundation: The National Science Foundation programs included in Title I of the bill are authorized to receive appropriations of $30 million a year for fiscal years 1984 through 1988. Approximately $15 million of this amount is targeted for workshops conducted by colleges and universities to improve the science, mathematics, and language skills of teachers. An addition-

al $10 million is earmarked for NSF grants to institutions of higher education to improve undergraduate training in these areas. The NSF is to expend the remaining $5 million on various education research projects.

The bill authorizes the appropriation of $100 million a year for fiscal years 1984 through 1988 for the National Engineering and Science Personnel Act of 1983. These funds are to be expended by the National Science Foundation through a system of matching grants to individuals and organizations. The matching funds are to come from other public or private sources, and the total monies provided under this program for any individual grant may not exceed one-half of the total amount of the grant.

The estimated outlays for the NSF progams are based on spending patterns experienced by similar NSF grant programs.

6. Estimated cost to State and local governments: Only the elementary and secondary education grants established under Title I of this bill and authorized at $250 million in 1984 and an estimated $264 million in 1985, would go specifically to state and local governments. These grants are to be allocated on the basis of demographic data and have no state matching fund requirement. To the extent governments are currently expending funds for the specific purposes of this bill, there could be a substitution of federal dollars for state and local dollars. This substitution, however, would not be significant since small amounts of state and local funds are currently being allocated for these specific science and mathematics programs. The other grant programs authorized by this bill are primarily for individuals, institutions of higher education, and the private sector.

7. Estimate comparison: None.

8. Previous CBO estimate: On February 15, 1983 CBO prepared a cost estimate on this bill as ordered reported from the House Education and Labor Committee. Funding levels for Title I Part B, Postsecondary Education, have been increased from $50 million to $70 million and have been reallocated between agencies and programs. Authorization levels for Title II, the National Engineering and Science Personnel Fund, have not changed, but the funds have been earmarked for specific programs.

9. Estimate prepared by: Deborah Kalcevic; Charles Essick.

10. Estimate approved by:

C. G. NUCKOLS
(For James L. Blum,
Assistant Director for Budget Analysis).

XIII. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no changed is proposed is shown in roman):

NATIONAL DEFENSE EDUCATION ACT OF 1958

TITLE I—GENERAL PROVISIONS

* * * * * * *

[DEFINITIONS

[SEC. 103. As used in this Act—

[(a) The term "State" means a State, Puerto Rico, the District of Columbia, the Canal Zone, Guam, American Samoa, the Virgin Islands, and, for the purposes of titles II, III, and V, the Trust Territory of the Pacific Islands, except that as used in sections 302 and 502, such term does not include Puerto Rico, the Canal Zone, Guam, American Samoa, the Virgin Islands, or the Trust Territory of the Pacific Islands.

[(b) The term "institution of higher education" means an education institution in any State which (1) admits as regular students only persons having a certificate of graduation from a school providing secondary education, or the recognized equivalent of such certificate, (2) is legally authorized within such State to provide a program of education beyond secondary education, (3) provides an educational program for which it awards a bachelor's degree or provides not less than a two-year program which is acceptable for full credit toward such a degree, (4) is a public or other nonprofit institution, and (5) is accredited by a nationally recognized accrediting agency or association approved by the Commissioner for this purpose or, if not so accredited, (A) is an institution with respect to which the Commissioner has determined that there is satisfactory assurance, considering the resources available to the institution, the period of time, if any, during which it has operated, the effort it is making to meet accreditation standards, and the purpose for which this determination is being made, that the institution will meet the accreditation standards of such an agency or association within a reasonable time, or (B) is an institution whose credits are accepted on transfer by not less than three institutions which are so accredited, for credit on the same basis as if tranferred from an institution so accredited. For purposes of title II, such term includes any school of nursing as defined in subsection (1) of this section; any proprietary institution of higher education (as defined in section 461(b) of the Higher Education Act of 1965) which includes in its agreement under section 204 of such title such terms and conditions as the Commissioner determines to be necessary to insure that the availability of assistance to students at the school under such title, has not, and will not, increase tuition, fees, or other charges to such students; and any school which provides not less than a one-year program of training to prepare students for gainful employment in a recognized occuption and which meets the provisions of clauses (1), (2), (4), and (5). If the Commissioner determines that a particular category of such schools does not meet the requirements of clause (5) (but meets the requirements of clause (4)) because there is no nationally recognized accrediting agency or association qualified to accredit schools in such category, he shall, pending the establishment of such an accrediting agency or association, appoint an advisory committee, composed of persons special-

ly qualified to evaluate training provided by schools in such category, which shall (i) prescribe the standards of content, scope, and quality which must be met in order to qualify schools in such category to participate in the student loan program under title II, and (ii) determine whether particular schools not meeting the requirements of clause (5) meet those standards. For purposes of this subsection, the Commissioner shall publish a list of nationally recognized accrediting agencies or associations which he determines to be reliable authority as to the quality of training offered.

[(c) The term "Commissioner" means the Commissioner of Education.

[(d) The term "Secretary" means the Secretary of Health, Education, and Welfare.

[(e) The term "State educational agency" means the State board of education or other agency or officer primarily responsible for the State supervision of public elementary and secondary schools, or, if there is no such officer or agency, an officer or agency designated by the governor or by State law.

[(f) The term "school-age population" means that part of the population which is between the ages of five and seventeen, both inclusive, and such school-age population for the several States shall be determined by the Commissioner on the basis of the population between such ages for the most recent year for which satisfactory data are available from the Department of Commerce.

[(g) The term "elementary school" means a school which provides elementary education, as determined under State law or, if such school is not in any State, as determined by the Commissioner.

[(h) The term "secondary school" means a school which provides secondary education, as determined under State law or, if such school is not in any State, as determined by the Commissioner, except that it does not include any education provided beyond grade 12. For the purposes of sections 301 through 304, the term "secondary school" may include a public junior college, as determined under State law or, if such school is not in any State, as determined by the Commissioner.

[(i) The term "public" as applied to any school or institution includes a school or institution of any agency of the United States, except that no such school or institution shall be eligible to receive any grant, loan, or other payment under this Act.

[(j) The term "nonprofit", as applied to a school or institution, means a school or institution owned and operated by one or more nonprofit corporations or associations no part of the net earnings of which inures, or may lawfully inure, to the benefit of any private shareholder or individual, and for the purposes of part A of title V, includes a school of any agency of the United States.

[(k) The term "local educational agency" means a board of education or other legally constituted local school authority having administrative control and direction of public elementary or secondary schools in a city, county, township, school district, or political subdivision in a State, or any other public institution or agency having administrative control and direction of a public elementary or secondary school.

[(l) The term "school of nursing" means a public or other nonprofit collegiate or associate degree school of nursing.

[(m) The term "collegiate school of nursing" means a department, division, or other administrative unit in a college or university which provides primarily or exclusively an accredited program of education in professional nursing and allied subjects leading to the degree of bachelor of arts, bachelor of science, bachelor of nursing, or to an equivalent degree, or to a graduate degree in nursing.

[(n) The term "associate degree school of nursing" means a department, division, or other administrative unit in a junior college, community college, college, or university which provides primarily or exclusively an accredited two-year program of education in professional nursing and allied subjects leading to an associate degree in nursing or to an equivalent degree.

[(o) The term "accredited" when applied to any program of nurse education means a program accredited by a recognized body or bodies approved for such purpose by the Commissioner of Education.]

DEFINITIONS

SEC. 103. Except as otherwise provided therein, the following terms are defined for purposes of this Act:

(1) The term "State" means any of the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Northern Mariana Islands, or the Trust Territory of the Pacific Islands.

(2) The term "institution of higher education" has the same meaning given such term in section 1201(a) of the Higher Education Act of 1965.

(3) The term "Secretary" means the Secretary of Education.

(4) The term "State educational agency" has the same meaning given such term in section 198 of the Elementary and Secondary Education Act of 1965.

(5) The term "school-age population" means that part of the population which is between the ages of five and seventeen, both inclusive, and such schoool-age population for the several States shall be determined by the Secretary on the basis of the population between such ages for the most recent year for which satisfactory data are available from the Department of Commerce.

(6) The term "elementary school" has the same meaning given such term in section 198 of the Elementary and Secondary Education Act of 1965.

(7) The term "secondary school" has the same meaning given such term in section 198 of the Elementary and Secondary Education Act of 1965.

(8) The term "local educational agency" has the same meaning given such term in section 198 of the Elementary and Secondary Education Act of 1965.

TITLE VI—EMERGENCY MATHEMATICS AND SCIENCE EDUCATION

PART A—ELEMENTARY AND SECONDARY ASSISTANCE

FINDINGS

SEC. 601. The Congress finds that in order to increase our Nation's economic productivity and ensure an adequate number of high school graduates to serve in the Nation's defense, it is necessary (1) to improve the quality of instruction and levels of achievement in mathematics and science at the elementary and secondary levels, and (2) to increase the supply and qualifications of teachers of mathematics and science at the elemantary and secondary levels.

AUTHORIZATION OF APPROPRIATIONS TO THE DEPARTMENT OF EDUCATION

SEC. 602. (a) There are authorized to be appropriated to the Department of Education to carry out this part $250,000,000 for the first fiscal year beginning after the date of enactment of this Act, and such sums as may be necessary for the second such year.

(b) No funds are authorized to be appropriated to carry out this part for any fiscal year if the amount appropriated to carry out chapter 1 of the Education Consolidation and Improvement Act of 1981 for such fiscal year does not equal or exceed the amount appropriated to carry out such chapter for the preceding fiscal year.

ALLOCATION OF FUNDS

SEC. 603. (a) The amount appropriated pursuant to section 602 for any fiscal year shall be allocated among the States in the same manner as is required by the second sentence of section 302(a)(1) of this Act, except that Puerto Rico shall be considered a State.

(b) From the amount allocated to any State pursuant to subsection (a) the State educational agency may reserve not more than 5 per centum of such amount for the conduct of State administration and planning activities pursuant to section 605.

(c) The remainder of the amount allocated to any State pursuant to subsection (a) shall be allocated by the State educational agency among the local educational agencies in that State as follows:

(1) Three-fourths of such remainder shall be allocated among local educational agencies so that each such agency receives an amount which bears the same ratio to the amount allocated under this paragraph in that State as the population aged 5 to 17, inclusive, in the school district of such agency bears to the total population aged 5 to 17, inclusive, in that State.

(2) One-fourth of the remainder shall be allocated among local educational agencies on the basis of such other factors as may be established by the Secretary by regulation, such as the number of children from low-income families.

USE OF FUNDS BY LOCAL EDUCATIONAL AGENCIES

SEC. 604. (a) Funds made available to any local educational agency pursuant to this part shall be used, in accordance with a

local application certified to meet the requirements of this part by the State educational agency for the improvement of education in mathematics and science. Such uses may include—

(1)(A) inservice teacher training for recertification in mathematics and science, for computer competency, and for upgrading and modernizing mathematics and science knowledge, and (B) inservice training for administrative personnel and for members of local boards of education;

(2) evaluation of local resources for education in mathematics and science;

(3) development of plans for modernizing and expanding courses of instruction in mathematics and science, and, where feasible, the implementation of those plans;

(4) the development of innovative resources in mathematics and science, including the use of emerging technologies and the development of curriculum; and

(5) the use of important community resources to achieve the purposes of this Act, including teachers, universities, the business sector, public agencies (such as libraries and museums), and other institutions, agencies, and individuals.

(b) Two or more local educational agencies are authorized to combine the funds they receive under this part for jointly operated programs in carrying out the purposes of this part.

(c)(1) To the extent consistent with the number of children in the school district of each local educational agency who are enrolled in private elementary and secondary schools, such agency shall make provision for including special educational services and arrangements (such as dual enrollment, educational radio and television, and mobile educational services and equipment) in which such children can participate and meeting the requirements of this section. Expenditures for educational services and arrangements pursuant to this subsection for children in private schools shall be equal (taking into account the number of children to be served and the needs of such children) to expenditures for children enrolled in the public schools of the local educational agency.

(2) The requirements of paragraph (1) may be waived in the same manner as the requirements of section 557(a) of the Education Consolidation and Improvement Act of 1981 and shall be subject to judicial review in accordance with section 557(b)(4) of such Act.

STATE USE OF FUNDS

SEC. 605. (a) Funds made available to any State educational agency from the allocation under section 603(b) shall be used, in accordance with a State plan certified to meet the requirements of this part by the Secretary—

(1) to cover the cost of administration with respect to programs conducted by local educational agencies with funds made available under this part;

(2) to develop statewide strategies to upgrade teacher certification standards;

(3) to make technical assistance available to local educational agencies, upon their request, to assist them in carrying out the purposes of this Act; and

(4) to conduct inservice training programs for personnel of the State educational agency and other State agencies with responsibility for education programs.

(b) Each State plan shall set out the allocation of funds received under this part among local educational agencies.

PART B—POSTSECONDARY ASSISTANCE

FINDINGS

SEC. 621. (a) The Congress finds that it is necessary (1) to improve the educational foundations of American citizens in order to improve the Nation's economic productivity, (2) to encourage students in postsecondary education to pursue teaching careers in mathematics, science, and critical foreign languages, (3) to encourage members of groups now underrepresented in mathematics, science, and critical foreign language teaching, including women, racial and ethnic minorities, and the handicapped, to pursue such careers, and (4) to improve the quality of instruction in colleges of teacher education.

(b) The Congress declares that it is therefore necessary (1) to increase the number and quality of postsecondary students entering careers in teaching, (2) to increase the number and quality of students entering teaching from groups now underrepresented in mathematics, science, and critical foreign languages, including women, racial and ethnic minorities, and the handicapped, (3) to improve the quality of instruction for future teachers of mathematics, science, and critical foreign languages, (4) to utilize the National Science Foundation when developing and monitoring programs designed to improve the quality of instruction for future teachers of mathematics and science, (5) to provide enriched opportunities for currently employed teachers, and (6) to evaluate (A) current teaching techniques, including technological improvements in classroom equipment and instructional methods and the use of community resources such as science museums, regional centers, public television, and community colleges, and (B) methods of improving instruction.

NATIONAL TEACHING INCENTIVE SCHOLARSHIPS

SEC. 622. (a)(1) Sums available for the purpose of this section shall be used to award national teaching incentive scholarships in accordance with this section to not more than 5,000 individuals for fiscal year 1984, and to not more than 10,000 individuals for fiscal year 1985. Such scholarships may not exceed an amount equal to the tuition and fee expenses of any recipient for two academic years (of undergraduate or graduate education) and may be paid only upon proof of satisfactory achievement in the preceding academic year.

(2) The Secretary of Education may reserve up to 30 percent of the sums available for national teaching incentive scholarships to make awards to individuals who are currently teachers for one year of study at an institution of higher education. Such awards shall not exceed $5,000 to cover the cost of attendance at such institution and related expenses.

(3) The Secretary of Education may reserve up to 10 percent of the sums available for national teaching incentive scholarships for in-

dividuals pursuing a course of instruction in a critical foreign language.

(b) Each chief State school officer or appropriate State officer responsible for postsecondary education may provide to the Secretary of Education the names and qualifications of a number of individuals who are qualified to receive national teaching incentive scholarships which does not exceed the product of the number of Members of Congress from that State, multiplied by twenty. The chief school officers of the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, the Northern Mariana Islands, and the Trust Territory of the Pacific Islands may each provide to the Secretary the name and qualifications of not more than fifty such individuals. Such nominations shall be supported by suitable academic credentials and recommendations, and shall include a personal statement by the individual expressing a commitment to pursue a career in teaching.

(c)(1) Recipients of national teaching incentive scholarships shall be selected by a committee composed of the Librarian of Congress (acting as chairman), the Secretary of Education, the Director of the Office of Science and Technology Policy, the Director of the National Science Foundation, the Administrator of the National Aeronautics and Space Administration, four individuals appointed by the Speaker of the House of Representatives, and four individuals appointed by the majority leader of the Senate. The individuals appointed by the Speaker and the Majority Leader shall be individuals (A) who are prominent in public or private elementary, secondary, or postsecondary education, such as teachers, professors, administrators, or officials, (B) who are practicing scientists or mathematicians, (C) who are in private business enterprises and who have a thorough understanding of the requirements for educated employees of business, or (D) who are members of the public, including parents of students and students.

(2) Selections of recipients of national teaching incentive scholarships shall be made in accordance with regulations prescribed by the Secretary of Education after consultation with the Librarian of Congress, the Director of the National Science Foundation, and the Director of the Office of Science and Technology Policy. Individuals shall be selected on the basis of merit and shall be pursuing a course of instruction in science, mathematics, or a critical foreign language. The committee shall ensure that the individuals so selected include individuals who are unrepresented or underrepresented in the respective disciplines, including women, racial and ethnic minorities, and the handicapped. The committee shall also assure appropriate geographic distribution of national teaching incentive scholarships.

(d) To be eligible for selection as a national teaching incentive scholarship, an individual shall have completed the equivalent of at least two years toward a baccalaureate degree and shall have formally expressed the intention to teach elementary or secondary school mathematics, science, or critical foreign language for at least two years for each year for which assistance is received under this section.

(e) Each recipient of a national teaching incentive scholarship shall be obligated to teach for two years for each year of assistance

received, or to repay the total amount of the scholarship, plus interest at a rate prescribed by the Secretary of Education.

(f) Notwithstanding the provisions of section 428(a)(2) (B) through (F) and section 482(a) (1) and (2) of the Higher Education Act of 1965, funds awarded pursuant to subsection (a) shall not be considered in determining eligibility for student assistance under title IV of such Act, but the sum of student assistance received under such title and a national teaching scholarship shall not exceed the cost of attendance (as such term is defined in section 482(d) of such Act). However, this subsection shall not be construed to require the payment of a scholarship of less than $1,000.

AUTHORIZATION OF APPROPRIATIONS

SEC. 623. Notwithstanding any other provision of this part, there are authorized to be appropriated to carry out this part $20,000,000 for fiscal year 1984 and such sums as may be necessary for fiscal year 1985.

PART C—TEACHER INITIATIVE GRANTS

AUTHORIZATION OF APPROPRIATIONS TO THE DEPARTMENT OF EDUCATION

SEC. 641. There are authorized to be appropriated to the Department of Education to carry out this part $5,000,000 for fiscal year 1985.

ALLOCATION OF APPROPRIATIONS

SEC. 642. The amount appropriated pursuant to section 651 for any fiscal year shall be allocated among the States in the same manner as is required by section 603(a) of this title.

USE OF FUNDS

SEC. 643. (a) Funds made available to any State pursuant to this part shall be used to make grants to teachers, who have completed inservice or other training under parts A or B of this title, for teacher initiated projects to improve mathematics, science, and technology education. Such uses may include--

(1) purchase of equipment for a specific classroom project or demonstration;

(2) purchase of specialized reference materials;

(3) transportation and other costs of participation for class visits to science museums, computer centers, laboratories, or institutions involved in research and development; and

(4) underwriting the cost of bringing special equipment or lecturers to the classroom or school for student and faculty enrichment.

(b) From the amount available to any State, the State educational agency may reserve not more than one percent of such amount for the conduct of State administration and activities to assist teachers in formulating programs eligible for grants under this part.

SECTION 406A OF THE GENERAL EDUCATION PROVISIONS ACT

[AUTHORIZATION OF APPROPRIATIONS FOR SCIENCE EDUCATION PROGRAMS

[SEC. 406A. There is authorized to be appropriated to the Secretary of Education for fiscal year 1981—

[(1) $2,500,000 for the purpose of carrying out the Pre-College Science Teacher Training program, and

[(2) $5,000,000 for the purpose of carrying out the Minority Institutions Science Improvement program transferred to the Secretary from the National Science Foundation by section 304 of the Department of Education Organization Act.]

AUTHORIZATION OF APPROPRIATIONS FOR SCIENCE IMPROVEMENT PROGRAM

SEC. 406A. There are authorized to be appropriated $5,000,000 for each of the fiscal years 1984 and 1985 for the purpose of carrying out the Minority Institutions Science Improvement program transferred to the Secretary of Education from the National Science Foundation by section 304 of the Department of Education Organization Act.

XIV. COMMITTEE RECOMMENDATIONS

A quorum being present, on February 22, 1983, the Committee ordered favorably reported the bill, H.R. 1310, by unanimous voice vote and recommends its approval.

ADDITIONAL VIEWS OF CONGRESSMAN DOUG WALGREN

The Committee's provision of the Emergency Mathematics and Science Education Act (H.R. 1310) which authorizes $20 million for programs in community colleges is critically important and should be underscored. Under section 205 of the bill, twenty percent of the $100 million Engineering and Science Personnel Fund, to be administered by the National Science Foundation, would be awarded to community colleges to establish and conduct model instructional programs in technician training, for providing professional development of faculty in this area, and for acquiring equipment and instrumentation.

The nation's 1,000 community and two-year colleges are the largest arm of American higher education, serving over five million students, 3.2 million of whom are in occupational courses.

As such, the development and distribution of excellent technician training programs in these schools is critical if our country is to meet the needs for technician training in our economy. Community colleges educate students of all ages and all income levels. As the cost of a college education climbs, they are often the only "higher education door" open to many low- and middle-income students. Additionally, many people—particularly those with jobs and families—find community colleges convenient and a cost-effective way to upgrade and learn new skills. Community colleges are focused on needs that many other institutions cannot address.

It has been estimated that supporting every professional, there are up to ten technicians. Think, for example, how much medical laboratory technicians have provided to our health care system. Peter Balke, Director of the International Robotics Institute, has said that his industry alone expects to grow from a $140 million a year business to an industry accounting for $2.5 billion in income annually. This will mean, he says, a tremendous displacement of workers and heavy retraining for jobs, nearly all of which will require a math base and technical skills, but not a bachelor's degree.

Community colleges, with their roots in local communities, are in the best position to develop job training programs in partnership with local industries. In the last decade, many community colleges have reached out to private employers and developed "employer specific" courses that provide training tailored to a company's defined skill needs. This bill should specifically encourage these efforts.

Private industry can share resources and know-how with faculty and students, while students train for jobs in the industry itself. General Motors, for example, has used community colleges for technician training in over 60 community colleges across the country. In short, community colleges are natural partners with the private sector.

The math-science crisis is a serious one. Our approach to solving it must be multi-faceted. H.R. 1310 is a big first step toward improving education at all levels and providing opportunities for students and teachers at all levels to learn what they need to learn to function in an increasingly technological world. Community colleges can make a critical contribution in this area, and I am pleased that the committee has recognized this role.

DOUG WALGREN.

MINORITY VIEWS—EMERGENCY MATHEMATICS AND SCIENCE EDUCATION ACT, H.R. 1310

The Minority Members, in general, support the concepts and goals behind H.R. 1310. However, we do have problems with the way the bill was considered, the lack of proper focus in the bill, the scope of the bill, and the budgetary impact.

We wish to express our deep concern over the fast track approach with which the Majority proceeded in considering H.R. 1310. In the Science and Technology Committee there was no opportunity at the subcommittee level for constructive hearings and critical testimony. We fully concur that there is a severe national problem in the lack of qualified teachers in the fields of math and science. This, of course, spills over and creates a student population that is inadequately educated in math and science at a time when America is entering a revolutionary period in high technology development. Nevertheless, to proceed in a matter of several weeks from one day of hearings, to markup, to reporting the bill, to having it on the House floor, does an injustice to the seriousness of the problem. We should not once again have to learn from past experience that "haste makes waste," yet, unfortunately, we feel there are parts within H.R. 1310 which will do just that. Most of these problems could have been avoided had the legislation proceeded at a more measured and deliberate pace. This would still have left adequate time for the programs to go into effect at the beginning of fiscal year 1984 as scheduled.

The testimony which we did receive, and the debate that followed, pointed out the excellent role the National Science Foundation has played in several science education areas. H.R. 1310 proposes to place many of these roles under the Department of Education rather than NSF. We believe this is a substantial mistake. Since 1952, the National Science Foundation has clearly had the lead role in precollege and postsecondary enhancement of science curriculum, student motivation, and teacher incentives. Under H.R. 1310, however, this mixture would be displaced.

A major goal of H.R. 1310 is to address the present inadequacies of qualified mathematics and science instructors, as well as retention of such individuals in the educational community. Though the Committee compromised by including the word "critical" to more clearly define languages to be given priority in this legislation, we believe that the inclusion of foreign language programs in any form is inappropriate, a monetary drain, and jeopardizes the integrity of the bill. We do not disagree that the foreign language disciplines also face serious problems on a national scale. However, we would encourage a separate approach to the problem, not a tagalong on a bill designed to address the problems of mathematics and science education.

Finally, we are compelled to point out that while H.R. 1310 is supposed to address an "emergency" in the field of mathematics and science education, it does so at potentially great damage to the federal budget and the projected deficit. While recognizing the seriousness of the problem, we feel that considerable tightening and strengthening of H.R. 1310 would lead to a more solid program and a more fiscally responsible one. As now reported, H.R. 1310 authorizes $425 million. The Administration's proposals, in similar areas, call for a level of $50 million. We believe the prudent course is somewhere between those two figures and it is our intention to offer amendments to correct that situation at the appropriate time.

LARRY WINN, Jr.
MANUEL LUJAN, Jr.
ROBERT WALKER.
BILL CARNEY.
JUDD GREGG.
JOE SKEEN.
CLAUDINE SCHNEIDER.
BILL LOWERY.
ROD CHANDLER.
HERBERT H. BATEMAN.
AL MCCANDLESS.
TOM LEWIS.

ADDITIONAL VIEWS OF MESSRS. SENSENBRENNER, SKEEN, CARNEY, BATEMAN, AND GREGG

The crisis in mathematics and science education falls into three areas: (1) we are not training enough math and science teachers to fill the need; (2) present teachers have not been as able to improve their skills through in-service programs, summer study, and work-study programs, as is necessary; and (3) too many teachers are leaving education to accept higher paying jobs in the private sector. H.R. 1310 addresses the first two problems well. But because it fails to deal with the third, it will not be as effective as it could, and actually might result in increasing the brain drain from education to private industry.

Some statistics graphically emphasize these points. Of 45 states responding to a national survey, 43 reported shortages of math teachers, 42 of physics teachers and 38 of chemistry teachers. The National Science Teachers Association estimates that some 32,000 classes in math and science which were needed for the 1982–83 school year could not be scheduled due to the lack of teachers. The National Council of Teachers of Mathematics reported that only 55 percent of the graduates prepared to teach math actually entered the teaching profession.

But most shocking is the statistic that almost five times more math and science teachers left teaching in 1980 for employment in non-teaching jobs than left due to retirement. If the present exodus of math and science teachers from secondary schools continues, the nation will suffer a net loss of 35 percent of the total by 1992.

The way this bill is drafted might well increase that figure. By increasing the skills of existing math and science teachers, without adopting a program to retain them in teaching, the temptation to leave teaching for the private sector becomes greater as those skills become more marketable. In some cases, H.R. 1310's programs may result in a transfer of the retaining costs from industry to the taxpayers. Thus, much of the good H.R. 1310 intends to accomplish will not be realized.

During Committee markup of this bill, we supported an amendment which would have diverted 50 percent of the amount authorized for the Engineering and Science Personnel Fund to a Presidential Science and Mathematics Improvement Program Fund. The $50 million authorized for the latter fund would be made available to states as block grants to develop programs to retain and increase the number of math and science teachers at the secondary school level through state-developed programs, including, but not limited to, salary bonuses and summer employment. Unfortunately, this amendment, which was designed to retain in teaching the teachers whose skills were improved by the other programs of this bill, failed on a division vote of 8–12.

The major argument against this amendment appeared to be that the federal government was intruding into the procedures by which teachers' salaries are set at the state or local level. This argument is categorically untrue. Not one dime of the money authorized is mandated to be spent on salary bonuses. That decision will be made at the state or local level, depending upon local needs and problems. This amendment merely allows the states to plug any holes in their own dikes, should qualified math and science teachers leave for private industry.

We plan to offer a similar amendment on the floor. To make this bill truly effective in solving the problems of math and science education, it should be approved.

F. JAMES SENSENBRENNER, Jr.
WILLIAM CARNEY.
JOE SKEEN.
HERBERT H. BATEMAN.
JUDD GREGG.

ADDITIONAL VIEWS OF CONGRESSMAN ROD CHANDLER

I join my colleagues in enthusiastic support of the concepts and intended goals of H.R. 1310, the Emergency Mathematics and Science Education Act. The current shortage of qualified people trained in math, science and related fields is critical in this time of national need. Enhancement of the existing workforce in these areas is essential to ensuring complete economic recovery and to the maintenance of our position among the world's industrial and technological leaders. We, as a Congress, must recognize our duty in taking immediate steps to do this.

Yet, in the spirit of economic recovery, we must also ensure that the precious budget dollars we request for this bill are used in the most cost-effective way. I feel that one of the most effective ways to allocate our limited funds would be to include a work-study provision in H.R. 1310. I believe that we should allow up to 10 percent of the money designated for scholarship awards to be used, at the discretion of the Secretary of Education, for work-study programs to be devised in cooperation with industry and funded at a minimum of 80 percent by private sector funds. This proposal has a twofold purpose. It would provide students both with income and with hands-on field experience, potentially using technology they might not otherwise have access to. Additionally, it would have the effect of stretching our federal dollars through augmentation by the private sector's contribution. Participation in the work-study program would be limited to those students having completed at least two years toward a baccalaureate degree and having formally expressed their intention to teach elementary or secondary math, science or other appropriate subjects, thus keeping the work-study component consistent with the intent of the entire bill.

Because of jurisdictional limitations, I was not able to offer this approach as an amendment during the Science and Technology Committee markup of this bill. I do intend, however, to offer this amendment at the appropriate time on the floor, in order to address this important issue.

ROD CHANDLER.

ADDITIONAL VIEWS—H.R. 1310

As the Committee was concluding consideration of this significant legislation, I expressed an affinity for someone who was asked to run a four minute mile without ever having been a jogger.

This was not an attempt to interject levity in otherwise sober deliberations. The subject at hand was and is far too serious for that. Rather it was the venting of frustration over the rush-rush manner in which everything seemed to be proceeding.

Hearings, the process by which we are exposed to expert testimony, were confined to a severely restricted schedule—hours, not even days.

Bi-partisan consultation and uninhibited free exchange of ideas among those on the Committee with differing philosophies were limited as the final design was being fashioned.

Advance notice of pending changes often was no more than minutes.

Despite the foregoing, perhaps in spite of it, the ultimate product is worthy of support.

There should be no doubt in anyone's mind regarding the proven need for the United States to substantially expand our commitment of resources devoted to education in general; science, math and critical foreign language studies in particular.

No longer are we talking about high technology being the wave of the future. It's here. And, quite frankly, we are in a sink or swim situation. Let there be no hesitation or reservation about which we shall do.

It has been suggested that the most important factor in the Japanese success in the area of productivity is the level of pre-college education in science and mathematics. That's a lesson well learned.

And it has been acknowledged that there is a serious deficiency in our foreign language capability at a time when there is a proven and critical need for an increased ability to effectively communicate with people the world over. The reasons why are endless.

As I see it, there is no choice, only an obligation. We must take action to guarantee a dramatic improvement in the level of competency in science, math and critical foreign languages. And the place to start and the people to start with is in our educational system and with our great resource, our young people.

In addressing the problem, one of the major question involves adequacy. Everyone seems to agree we must do something. How much?

The President deserves commendation for the initiative he launched in his State of the Union message. He set the stage for the swift response in Congress to his call for action.

What we are in the process of doing is taking a good idea and

running with it, perhaps not at the pace of the one minute four miles, but considerably beyond that of the average jogger.

In short, in a bi-partisan manner we are doing something which has to be done. For the good of the country.

SHERWOOD BOEHLERT.

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